Bengal Secretariat Library Copy
To be returned when done with

REPORT

OF THE

PROCEEDINGS

OF THE

FOREST CONFERENCE, 1873-74,

HELD AT

ALLAHABAD, JANUARY 15—19, 1874.

EDITED BY

B. H. BADEN POWELL, B.C.S.,

AND

J. SYKES GAMBLE, B.A.

X/125

CALCUTTA:
OFFICE OF THE SUPERINTENDENT OF GOVERNMENT PRINTING.
1874.

Nos. $\frac{10}{656 \text{ to } 692}$

Extract from the Proceedings of the Government of India in the Department of Revenue, Agriculture and Commerce,—dated the 23rd June 1874.

[FORESTS.]

READ—

Circular No. $\frac{25}{1286-1292}$, dated the 6th November 1873, from the Department of Revenue, Agriculture and Commerce, inviting the co-operation of local Governments and Administrations to the proposed scheme for holding a conference of Forest Officers at Allahabad in January 1874.

Letter dated the 9th April 1874, from Mr. B. H. Baden-Powell, B.C.S., submitting copy of the report of the Forest Conference of 1873-74.

RESOLUTION.

The periodical Conference of forest officers, which was first commenced in December 1870 by Mr. B. H. Baden-Powell when Conservator of Forests in the Punjab, has this year been held at Allahabad, and has been attended by forest and civil officers from the Bombay Presidency and from different provinces under the Government of India.

2. Its proceedings have been reported in the volume submitted by Mr. Baden-Powell, which constitutes a valuable contribution to the forest literature of this country, well deserving the attention of all concerned in the administration of Indian forests. During the discussions which are recorded in this report, many ideas were broached and resolutions passed which the Government of India is not prepared to adopt or endorse. Nevertheless the Governor General in Council cordially acknowledges the great value of the present publication, and desires to convey his thanks to the members of the Conference for their contributions and co-operation, and particularly to Messrs. Baden-Powell and Gamble for their careful report of the proceedings.

3. On several important topics discussed at the Conference, Mr. Brandis, the Inspector General of Forests, who has since returned to this country, has recorded his remarks in a memorandum which His Excellency in Council desires should be circulated with the report.

4. The next Conference is intended to be held at Simla about the 15th September 1875. As many forest officers as can at that time be spared in the different provinces under the Government of India should be encouraged to attend, and His Excellency the Governor General in Council also hopes that the Governments of Madras and Bombay may find it convenient to depute at least one member of their forest establishments. It also appears desirable to His Excellency in Council that a few civil officers and officers of the Public Works Department, the Survey Department, and other scientific branches of the service should be invited, if no additional expense will be incurred by their being absent from their ordinary duties.

5. Forest officers and others who wish to make communications at the next Conference should address the Inspector General of Forests, with whom it will rest to arrange the programme of the meeting and fix the order in which the different communications shall be taken up.

ORDER.—Ordered, that copies of this resolution, together with copies of the report and of the memorandum by the Inspector General of Forests, be forwarded to the Governments of Madras and Bombay, and to the local Governments and Administrations noted in the margin, with the request that a copy be furnished to every forest officer of the grade of Sub-Assistant Conservator and upwards who has not already received one as a member of the Conference.

Bengal.	British Burma.
North-Western Provinces.	Mysore and Coorg.
Punjab.	Assam.
Oudh.	Hyderabad.
Central Provinces.	Ajmere.

Ordered also, that a copy should be sent to each member of the Conference.

Ordered also, that a copy should be sent to the Surveyor General, the Superintendent, Geological Surveys, the Director of State Railways, the Inspector General of Forests, and the Financial and Public Works Departments, for informatiom.

(True extract.)

A. O. HUME,

Secretary to the Government of India.

Memorandum by D. Brandis, Esq., Inspector General of Forests, on several matters discussed at the Forest Conference, dated the 1st June 1874.

The relation between forest and civil officers occupies pages 31—44 of the report, and the discussion on this subject extended over the reorganization of forest establishments. The resolution recorded by the Conference (page 41) puts clearly and forcibly the principal drawbacks of the existing organization, and sketches out definite proposals for its improvement. Whatever may be thought of the value of these proposals, there is no doubt that the main question is to bind together as closely as possible the forest administration with the civil administration of the country, and at the same time to secure an efficient protection and a rational management of the Government forests. There is no real difficulty in attaining this object, for in those countries of Europe where a well-regulated administration of the public forests exists, it works hand in hand with the civil administration, and yet at the same time strict professional control is maintained. All that is required is, to apply the experience of generations obtained in the public service of those countries to the peculiar circumstances of government in India.

2. At the outset we should bear in mind that forest administration in India stands upon a different footing in different provinces. In some, as in Sindh, the Central Provinces, and Oudh, the demarcation of the forest domains of the State, and their separation from the great mass of forest and waste lands, has been nearly completed, though in some cases the right of the State over its forest domain is not absolute, but is limited by the rights of the people in the vicinity of the forests.

In other provinces again, the separation of the State forests from the rest is not yet complete, and Government is engaged in gradually effecting this separation, and has meanwhile undertaken the management of the waste and forest in which its rights are not clearly defined. In some cases, the rights of the people in forests protected or managed by Government are greater than those of the State.*

3. Had the State forest domains been finally demarcated and liberated of all forest rights of other persons, it

* Forest tracts of Hazara, belonging for the most part to village communities, but managed for their benefit by the Forest Department. Forest lands of Mhairwara. Sacred forests in Coorg, protected by Government.

would then be possible to entrust their management to a centralized department analogous to that of the State Railways. It is, however, extremely doubtful whether, even in that case, such an arrangement would be expedient, as the management of such extensive areas must, under all circumstances, largely affect the interests of the population in the vicinity. The question therefore remains the same in all provinces, how to combine efficient professional control with a close union of the forest and civil administration.

4. The resolution of the Forest Conference proposes to effect this by placing the *executive* forest officers entirely under the orders of the civil district officer in all non-professional matters, while in all purely professional matters they should be under the orders of the forest *controlling* officer. It further proposes that the final direction on all professional subjects connected with the utilization, management, and reproduction of the forests should be vested in a board of three officers under the Government of India, the Inspector General of Forests being President.

5. These proposals are correct as far as general principles are concerned; the difficulty would be to carry them out in practice under existing circumstances. The first difficulty is, who are the *controlling* and *executive* forest officers? As matters stand at present, it is not possible to draw a sharp line of separation between these two classes of charges.

In the Punjab, for instance, the officer in charge of the plantation division is certainly a controlling officer; he has, or ought to have, under him an executive officer in each circle. But it is difficult to say whether the officers in charge of the Upper and Lower Chenab, of the Upper and Lower Ravi, and of the Sutlej Division, are executive or controlling officers, for, with regard to one portion of their divisions, they have executive duties, while with regard to outlying portions they are controlling officers.

Nor is the distinction between controlling and executive officers in all cases sharply defined on the Continent of Europe. The "Revier förster" in Bavaria and Wurtemberg, who have small districts, are more executive officers, while in Prussia the officer who holds the same position (*Ober förster*) is more a controlling officer and has charge of a larger division.

6. Under these circumstances, it is preferable at present to speak of the Conservator, or chief officer in each

province, as the *controlling* officer, and of the officers subordinate to him as *divisional* officers. In regard to the latter class, the improvement to be effected in order to give effect to the general principles noted, is simply this, to increase the number of divisional officers who are directly subordinate (in professional matters) to the Conservator. This is the first step towards making the forest divisions coincide with the districts of the civil administration (Collectorates or Deputy Commissionerships), and to make divisional forest officers subordinate to the civil district officer in all non-professional matters. When the subordinate forest establishment is fully organized, then these divisional (or district) forest officers will in most cases have a number of executive officers under them, each in charge of a forest range; but they will not, as is assumed in the Conference resolution, be themselves executive officers.

7. A different question, which is worth considering, is, whether it would not be preferable in the larger provinces to have several Conservators in the place of one; this would meet one of the proposals made by the Conference; but it will probably be some time before such an increase in the number of the superior officers of the department can be thought of. As matters stand at present, we must be satisfied if we have a Conservator in each province with one or two personal assistants in the larger provinces, and as many divisions, directly under the Conservator in professional matters, as there are civil districts with important forests. Even this improvement we shall only be able to effect gradually, and in many cases it will not be easy to make the limits of forest divisions conterminous with the civil districts. Where the timber is floated out, the river basin marks the extent of the forest division, and in other cases the line which separates two adjoining civil districts will often be found to cut a forest in two in an inconvenient manner.

8. The principles here noted guided me in framing the proposals for the reorganization of forest administration in Bombay, which I had the honor of submitting after my tours in the Sindh and Bombay forests in 1869 and 1870. This organization has not been noticed by the Forest Conference. There are now three controlling officers in the Bombay Presidency—the Conservator of Sindh and the two Conservators of the Northern and Southern districts of Bombay. In Bombay proper, one district forest officer was proposed and sanctioned for each Collectorate with important

forests; his relations to the Conservator and the Collector were clearly defined in paragraphs 43 to 57 of my report of 18th June 1870, which was approved by the Bombay Government* and sanctioned by the Government of India.† The district forest officer was made the assistant to the Collector for all forest business; in ordinary cases he was to receive all his orders from the Collector, and was made directly responsible to that officer. On the other hand, the general control of all forest business was vested in the Conservator, subject to the orders of the Bombay Government; he was to take the initiative in all forest matters, but all his orders and other communications to district forest officers must be sent through the Collector. Verbal orders given to his subordinates in the forests should be reduced to writing, and should be communicated by the Conservator to the Collector for his approval. Again, all orders given by the Collector to the district forest officer were to be communicated to the Conservator. It was acknowledged that under this arrangement a clear separation of duties could not be attempted, but that in regard to certain subjects the Collector, and in regard to others the Conservator, would be held specially responsible. Thus the Conservator was held specially responsible for the economical working of the department, for the maintenance, improvement, and proper utilization of the growing stock in the forests, and for the efficiency of the subordinate forest establishments. On the other hand, the Collector should be held more responsible for the protection of the forests, that is, the maintenance of the forest area, guarding against alienation and encroachments, and prevention of injury to the forests. An essential part of these arrangements was that all forest operations should be regulated by a regular plan, to be prepared annually in June or July for the ensuing working season, comprising all that had to be done in timber works, in planting, road-making, and other work for the improvement of the forests. These annual plans of operations would be agreed to by Collector and Conservator, and would regulate all operations during the year.

These are the outlines of an organization, the main points of which have been sanctioned and carried out, and which has now stood the test of actual experience. As

* Paragraphs 9 and 10 of Bombay Government resolution dated 6th August 1870.

† And paragraph 13 of Government of India resolution dated 21st October 1870.

might be expected, its actual working was different in different districts; and this may explain that Mr. Macleod Campbell, C.S., now Conservator of Forests in Sindh, who for some time was District Forest Officer in Tanna, and gave an account at the Conference of forest organization in Bombay, never alluded to the orders passed by the Bombay Government in 1870, and stated that, before leaving Tanna, he had proposed that the Conservator's authority should be restricted to professional matters.

9. The Bombay organization of 1870, though by no means perfect, might still prove suggestive in other provinces of improvements in the direction here discussed; but, as said above, the first move is to make the forest divisions to coincide with the civil districts, and this would, in most cases, require a large increase of the number of divisional forest officers. In Bombay their number was 9 when I submitted my proposals. I proposed to increase them to 14; my proposal was sanctioned and has been carried out. A certain improvement can however, in many cases, be effected by transforming sub-divisions into divisions, and by placing sub-divisional officers directly under the Conservator. But in all these questions of organization, the requirements of each province, and of each division and sub-division, must be taken upon their own merits.

10. In a letter which I addressed to the Chief Commissioner of the Central Provinces on the 12th September 1870, I suggested that the Bombay organization be introduced in certain districts where the limits of forest divisions could be made to coincide with the boundaries of civil districts. Thus, in place of the old five* divisions, I suggested that there should be eight (by raising three sub-divisions to the rank of divisions) without any additional cost, and that in three of these (Nimar, Wurda, and Mandla) the district forest officer should be in the position of an Assistant to the Deputy Commissioner. The object was to secure a more efficient supervision by the Conservator, who would then have direct dealings with eight in the place of five divisions, and to facilitate the co-operation of district and forest officers.

These proposals have not entirely been acted upon in the Central Provinces; but it is in this direction that improvements must be made, and it is in this manner that the principles justly urged by the Conference can be carried out.

* Northern, Central, Southern, Eastern, Western.

11. *The ascertainment of the forest area required in each province* occupies pages 88 to 107. The resolution at the end mainly relates to the organization of a "survey and working plan staff" in each province, and is in the right direction, though it undervalues the advantage of accurate forest maps. But the idea that an elaborate examination of each province or district is required in order to enable us at the present time to say what proportion of the area should be kept under forest, does not commend itself to me as suggesting a practicable scheme. A few hilly tracts of limited extent in the moister districts of India* have such large extents of untouched forest land that the choice of the areas to be reserved may be difficult. But, as a rule, not even excluding Pegu, Coorg, North Canara, and the Himalaya in British territory, the rule is plain and simple,—to demarcate as State forest as large and compact areas of valuable forest as can be obtained free of forest rights of other persons. In Pegu, for instance, it will be *extremely difficult* to secure for Government large and compact areas of teak-producing forest *free of toungya cultivation;* in North Canara, private claims of various kinds will interfere with the demarcation of large and compact forest reserves; and the same obstacles to the formation of large reserves exist in all wooded districts in British territory.

Supposing a careful survey of the province of Coorg seemed to justify the conclusion that 20 per cent. of the area should be maintained under forest, what guarantee is there that that proportion will be found sufficient 20 years hence? The task which, according to the proposals of the Conference, the Forest Department is to undertake, seems to me impossible and unnecessary, for in most provinces the only difficulty is to get sufficiently large and compact areas of forest that will pay, at the disposal of Government, and free of forest rights; and in those districts where forests are in superabundance, as on the Arracan hills and in some parts of Assam and Eastern Bengal, we can afford to wait, until the demand for forest produce from those districts rises sufficiently, to give the forest question a tangible shape.

12. Pages 108 to 134 are devoted to the important subject of *forest rights and privileges.* The remarks made

* Sumbulpore (nearly all private property).
Assam (eastern districts).
Hills of Eastern Bengal.
Arracan.
Tenasserim.

are right upon the whole, but I regret the undue prominence given to the conservancy of the so-called *unreserved forests*. The forest policy of the Government of India must be as simple and as easily intelligible as possible, and there are two ways in which it has hitherto manifested itself. One plan was to declare certain trees as reserved, and to protect them wherever found. *Teak*, *black-wood*, *sandal-wood* were Royal trees in Southern India and (*teak* in) Burma under native rule, and to protect them by including them, together with others, in a reserved list, was in accordance with old established custom. The first attempts at forest conservancy in India were all in this direction, and this plan should be maintained for the present in the unreserved or open forests, which are not included within the demarcated reserves.

13. The other plan is to demarcate forests which are at the disposal of Government, including some which are the property of village communities, but which on public grounds it is desirable to place under the protection and control of the Forest Department (Hazara forests: sacred groves of Coorg: village forests in Mysore and South India), and to manage them as public estates for the benefit of the proprietor and of the country at large. This is the system maintained in all countries of Europe which have a regular administration of their public forests, and it is the only one which is likely to have permanency in India. For the present at least we must concentrate all our efforts upon the selection and demarcation of the reserves, that is, upon the formation of State or village forests, and upon their protection and good management. The other public forests, which are not included within the limits of the reserves, and which are generally known under the name of *unreserved*, *open*, or *district forests*, may eventually partly be assigned to towns or villages, and in that case may likewise be demarcated, placed under the protection of Government, and subjected to the control of the Forest Department. But that is a matter for future consideration. Our first task is to form and consolidate the *State forest domain*, and to place its management upon such a footing that it will give a steadily increasing revenue and, while contributing largely to the well-being of the people, be a source of strength to Government. This is a plain practicable task, and quite as much as we ought to undertake at the present time with our limited means and the small number of experienced and really useful officers at our disposal. The selection and demarcation of these

reserves demands time, and can only be done gradually; and for that reason we must retain a hold over the *residuum* of forest land, guard against the alienation of valuable portions, and protect it against devastation as far as possible. More we ought not to attempt at present, and in my opinion it is the duty of Government to resist all attempts on the part of local authorities to fritter away the time and energies of forest officers on other matters. If we attempt more, the result will be that our main work will be neglected. Moreover, as long as we confine strict conservancy to defined areas of limited extent, (taking the hill tribes within the reserves—Kurkus, Gonds, Koorumbers, Karens—under our special protection,) we shall interfere much less with the customs and privileges of the people than if we attempt the impossible task to preserve the great mass of waste and forest land not included within the limits of the reserves.

14. However, the spirit of the discussion at the Conference on this subject seems to have been quite the other way.

The Mailghat forests of Berar formed one of the main subjects of discussion. There is a demarcated reserve of 400 square miles, the Byragurh reserve, which I examined in company with the local forest officers in March 1869.* The result of my visit was, that I proposed that all work should be concentrated upon the protection and improvement of the more valuable portions of the reserve, and that in order to provide for the supply of the western part of the Poorna valley, a second reserve should be formed in the western part of the hills; that the reserves should be strictly protected, without interfering with the cultivated and culturable lands actually occupied; but that in the rest of the Mailghat, outside the reserve, no restrictions should be imposed, and the inhabitants should not be interfered with.

This policy has apparently not been followed, an attempt has been made to protect the whole of the Mailghat, and as a necessary consequence the protection of the reserve has been relaxed. Doubtless the circumstances in the Mailghat are peculiar; the number of villages in the reserve had gradually increased, and had rendered strict protection more difficult than was anticipated in 1869; nevertheless it would probably have been better to diminish the area of the reserve, or to divide it into a number of smaller reserves, than to give up the plain broad principle which I endeavoured to urge upon the local authorities in 1869.

* Report to the Resident at Hyderabad dated 21st April 1869.

15. I should not have entered so fully into this question if its bearings had always been correctly understood. I have seen it stated elsewhere, that the plan of forming reserves to be the permanent forest domain of the State (or of village communities under the protection and management of Government officers) was likely to cause more discontent than the attempt to protect all or a greater portion of the forest lands over which Government has rights. There is no greater fallacy than this. The trouble of effecting the settlement of forest rights and privileges on limited well-defined areas is temporary and will soon pass away, whereas the annoyance to the inhabitants by the maintenance of restrictions over the whole area of large forest tracts will be permanent, and will increase with the growth of population.

O. S. G. P.—No. 763, R., A. & C.—23-6-74.—400.

REPORT

OF THE

PROCEEDINGS

OF THE

FOREST CONFERENCE, 1873-74,

HELD AT

ALLAHABAD, JANUARY 15—19, 1874.

EDITED BY

B. H. BADEN POWELL, B.C.S.,

AND

J. SYKES GAMBLE, B.A.

CALCUTTA:

OFFICE OF THE SUPERINTENDENT OF GOVERNMENT PRINTING.

1874.

CALCUTTA:

PRINTED BY THE SUPERINTENDENT OF GOVERNMENT PRINTING,
8, HASTINGS STREET.

CONTENTS.

	Page.
List of Officers present and list of Contributors	1
Date for future Conference	2
The Forest Quarterly Magazine	2
Subjects discussed—	
I.—Forest legislation and the defects of the existing law	3
II.—The relations of Forest Officers to Civil Officers of Districts and Divisions	31
III.—Forest Revenue, and Financial position of forest work in India ...	45
IV.—The ascertainment of the forest area required in each province ...	88
V.—The settlement of rights and privileges in forest lands	108
VI.—Systems of extracting forest material by Permit, License, and Government Agency	135
VII.—The method of planting in the lower hills of the Himalaya and in arid and desolated regions	151
VIII.—The present state and future prospects of the Himalayan Cedar Forests	180
IX.—Forest Terminology	203
X.—Date of meeting for future Conferences	204
XI.—Pension and Widows' Fund for the Forest Service	205
Conclusion	207

REPORT

OF THE

PROCEEDINGS

OF THE

FOREST CONFERENCE, 1873-74.

The Conference met at the Public Works Department Offices at Allahabad on Wednesday, January the 15th, at 11 A. M.

The following officers were present :—

COL. E. M. PLAYFAIR, Deputy Commissioner of Nimar, Central Provinces.
MR. BADEN POWELL, B.C.S., Officiating Inspector-General of Forests.
DR. W. SCHLICH, Conservator of Forests, Bengal.
CAPT. THOMAS LEWIN, Deputy Commissioner, (Chittagong, Bengal).
MR. J. MACLEOD CAMPBELL, C. S., Conservator of Forests, Sindh.
MR. B. RIBBENTROP, Deputy Conservator of Forests, Punjab.
CAPT. DOVETON, Conservator of Forests, Central Provinces.
MR. A. T. DRYSDALE, Deputy Conservator of Forests, Berar.
MR. BIRNIE BROWNE, Deputy Conservator of Forests, Punjab.
MR. J. SYKES GAMBLE, Assistant Conservator of Forests, Bengal.
MR. G. F. PREVOST, Assistant Conservator of Forests, Berar.
MR. F. D'A. VINCENT, Assistant Conservator of Forests, Punjab.
MR. S. KURZ, Royal Botanical Gardens, Calcutta.
MR. H. LEEDS, Deputy Conservator of Forests, Central Provinces.
MR. W. H. REYNOLDS, Assistant Conservator of Forests (Survey and Working-Plan Branch).
MR. G. GREY MINNIKEN, Assistant Conservator of Forests, Punjab.
MR. A. E. WILD, Assistant Conservator of Forests, Punjab.
MR. J. MCKEE, Assistant Conservator of Forests, Central Provinces.
MR. H. CALTHROP, in special employ, Punjab.

Papers were also communicated by the following gentlemen, who could not attend personally :—

CAPT. KENNETH MACKENZIE, Deputy Commissioner, Ellichpore, Berar.
MR. G. GREIG, Conservator of Forests, North-Western Provinces.
MR. C. F. AMERY, Deputy Conservator, North-Western Provinces, (Gorukpore).
MR. W. CRAW, Superintendent, Ranikhet Plantation Works.
MR. G. DUFF, Deputy Conservator, Beas, Division (Punjab).
MAJOR PEYTON, Conservator of Forests, Southern Division, Bombay.
MR. SHUTTLEWORTH, Conservator of Forests, Northern Division, Bombay.
CAPT. E. S. WOOD, Conservator of Forests, Oudh.
MR. NARAYAN ANAND, Sub-Assistant Conservator of Forests, Bombay.
MR. M. H. FERRARS, Assistant Conservator, British Burmah.
MR. J. K. HUME, Assistant Conservator, British Burmah.
MR. E. P. DANSEY, Assistant Conservator, British Burmah.
MR. A. PENGELLY, Assistant Conservator, North-Western Provinces.
MR. T. G. ATKINSON, Sub-Assistant Conservator of Forests, Punjab.

1.—Date for future Conference.

The President asked that the settlement of a more suitable date for a Conference should be taken into consideration, and invited the members to be prepared on the last day of the Session to determine a suitable season for future Conferences, at the same time to intimate some important subject which might be specially discussed at the next Conference, thus giving a year's notice to enable a thorough examination and study of the subjects to be made. Of course subjects additional to these, might be proposed during the year.

2.—The Forest Quarterly Magazine.

The President then announced that he had received replies from all forest officers regarding the establishment of a Forest Magazine, and that it now seemed feasible to start a Periodical quarterly.

It was resolved *nem. con.* :—

That a Quarterly Magazine be commenced, and that the subscription be fixed at Rs. 12 per annum, and that all local Governments be invited to subscribe for a certain number of copies for the use of their Secretariat.

That during the absence on furlough of Mr. Baden Powell, Dr. Schlich, Conservator of Bengal Forests, should act as Honorary Editor.

FOREST LEGISLATION AND THE DEFECTS OF THE EXISTING LAW.

3.—On the present state of the Forest Law of India.

MR. BADEN POWELL then read a paper "on the defects of the existing Forest Law (Act VII of 1865), and proposals for a new Forest Act," as follows:—

If I were to examine the subject of the present note fully, I should begin with the political economy of forestry and ask the question, "Why should Government cultivate forests? why not leave it to private persons, as is done in the case of cereal crops?" This course would, however, lengthen my remarks too much, and I must beg my hearers to assume so much as is borne out by well-known and established reasons, *viz.*, that it is the duty of the State (1) to preserve and treat properly its own forests, which are in fact a peculiar class of lands entrusted to the State for the public benefit, and (2) it is its duty to interfere in aid or in restraint of the powers of communities and in some cases of private proprietors, when the unaided power of the individual or community is insufficient, or when such power is exercised in a way which causes the State at large to suffer.

I assume also in this paper, that every one admits the utility of forests, *first*, in a direct manner by the supply that they yield for building, manufactures, and fuel, and *secondly*, in an indirect manner by their climatic effects. These effects I am not going to discuss, especially as other papers will deal with the subject; only this I will say, that while it is doubtful whether, by the creation of forests, we can positively increase the rainfall, it is equally certain that the destruction of forests causes a diminution of rainfall; that it causes injury to the climate, renders mountain lands liable to abrasion, to the formation of deep ravines and landslips, and to the descent of masses of boulders and sand capable of de-fertilizing lands below and destroying roads, bridges, and other costly public works; that it causes sudden and irresistible rising of torrents, endangering human life and works of industry, and altogether upsets the gradual and even distribution of rainfall and the dispersion of moisture by atmospheric evaporation, which is the more dangerous in tropical climates, where the fall is limited in duration and violent in its temporary action.

Wherever the State is the absolute proprietor of forest lands, it can of course exercise its proprietary rights and keep these lands in a proper condition; even where its right is limited, it can, at any rate, protect so much as it has.

In the exercise of the proprietary right, however, the State is not actuated by the purely selfish or temporary motives of a private owner or speculator. The State is to be considered rather as called on to fulfil a great public trust, on which it brings to bear the resources of the superior skill and knowledge at its command as well as the executive force of its servants and employés. As this property is a peculiar kind

of property differing in its uses, treatment, and in the results which it effects, from other property, it is found convenient for the legislature to assist its management by creating certain special rules for its protection. In the first place, it makes various acts which are detrimental to the forest, penal. To such acts, perhaps, the ordinary criminal law would not apply, or it would not provide an adequate punishment under the peculiar circumstances of the case. A good instance of this is afforded by the case of Government marks on *standing* trees designed for removal. Here great frauds may be perpetrated by removing or altering the marks and marking new trees, but the tree not being *moveable property* as it stands, the mark on it is not a "property mark" within the meaning of the Indian Penal Code, and these sections cannot be applied.

Again, it is necessary to organize establishments and all matters connected with forest management and with the exploitation and transport of timber; hence everybody recognizes that the legislature rightly interferes to provide a special set of regulations (with penalties for the breach thereof) relating to forest management and its several connected subjects.

Now, if all forests were enclosed places with which the neighbouring residents had no more concern than they have with my wheat-field or my rose garden, our inquiry would stop here, at any rate as regards the principles of legislation.

And strange to say, our so-called Forest Law (Act VII of 1865) does actually stop here, giving power to make special rules on certain subjects of which a limited and very incomplete list is added, and then after a few sections about penalties abruptly closing.

But it will be obvious to every one that forests are not so situated as to be disposed of in this way; and the first thing really to be done is to consider our forest *in its relation to the inhabitants* of the vicinity, and to private individuals and communities generally, and then we shall find out that very important matters have to be settled, and that by clear legislative sanction, *before* we are in a position to apply the special rules just alluded to.

The Indian forests will be found to exhibit the following conditions:—

(1).—A very large proportion of them are admitted to be the absolute property of the State, at any rate in theory. The State had not, it is true, exercised that full right; the forest was left open to any one who chose to use it, *but the right was there.* Every native ruler closed, when he chose, whole areas of forests to preserve the game, and as in the well known instance of the forests of the Amirs of Sindh, and in other parts, punished with the utmost cruelty the slightest trespass within the forest limits. Whenever this was not the case, people were *in the habit of doing* what they pleased, no one caring to stop them. Here, then, we have forests "*absolutely the property of the State.*"

(2).—The Government in some cases declared its proprietary right to the forests, but granted recognized, though in all cases undefined, *rights* properly so-called, in these forests, by solemn record at settlement. Here we have "*forests in which the property of the State is burdened with real legal rights.*"

(3).—In other cases the Government settlement officers and collectors in early times granted away the forest land, reserving certain rights in it only to the State. Thus, in Ratnagiri district of Bombay, the

Collector in 1824 granted away all the forest lands, then rich and abundant; afterwards Government recalled part of the grant and reserved to the State the right to certain kinds of trees growing on land which they left to the landholder as his property. Again, in Kangra, Gurdaspore, and perhaps in other districts of the Punjab, the settlement officers, acting with that ignorance of forest conservancy which characterized those and many subsequent years, voluntarily let go the forest lands, reserving only the right of the State to the existing or growing stock on the ground. In Hazara they reserved nothing but the right to conserve and the right to take a proportion of the gross income, fixed now at 50 per cent., to pay for the cost of protective establishment, &c.*

Thus, all over India, forests came to be naturally separated into three classes—

I.—*State Forest in which no rights exist.*

II.—*State Forest in which rights exist.*

III.—*Private or communal forests, which once were State forests,* but which the action of the officers of Government so affected, that *now they can only be called private or communal estates, on which the State possesses limited rights, viz.,* ownership of *(a)* all, or *(b)* of certain kinds, of standing trees; or possesses a right of conservancy and of taking a portion of the income to defray the costs thereof.

That this is the normal *legal* condition (in one or other class) of all forests in all India, there cannot be the slighest doubt. But certain other influences had a practical bearing on the state of the forest, which have led certain officials commenting on this obvious classification (introduced into our Draft Forest Bill) to question its correctness.

To these influences we must now direct our attention. Eliminating all those forests of the 2nd and 3rd classes which, in virtue of the unfortunate but irrevocable action of Government authorities in days past, were either saddled with obnoxious *rights* or almost wholly taken out of the category of State property altogether, we turn to those forests which in theory are the *absolute* property of the State. When we began to take these forests under management, we found them everywhere *used* by all classes to get what they required, without let or hindrance, but not in pursuance of what could be called a legal, prescriptive, or granted right. This state of things exists in all the forests of Bengal, and in all those of Central Provinces, Mysore, and Madras†, and of the richest forest district of Bombay,—Canara, also in some of the forests of the North-Western Provinces, and many of the forests and jungles of the Punjab.

In all these the right is absolute in theory, but by the "laisez-aller" action of the State and by its practical every-day policy, it has never been fully acted on. Take the Central Provinces. Of the total area of 111,121

* I do not criticise the action taken in Hazara; there is at least strong ground for argument, which there certainly is not in the other districts, that the State never at any time owned the forest lands.

† As far as I have any information, I can nowhere find any connected general view of the distribution of the Madras Forests as a whole, or of their *status*. We have some botanical sketches and some interesting but disconnected accounts of forests in the Anamullai, Shervaroy, Pulney, and Malabar hills, but that is all.

square miles (including feudatory states), we have about one-fourth or 29,656 square miles cultivated, all the rest being either poor jungle or forest. There is, perhaps, no province where the theoretical right of the State is more unequivocally asserted, and none where any attempt to act on that right has been, rightly or wrongly—I do not here discuss—more completely opposed; and this is true of most other forests similarly situated. How comes this? The answer is simple. The former rulers of these lands, of course, had no idea of what forests were worth in any sense of the word; they only looked on them as immense jungles that were infested with tigers and wild beasts, and were far larger than was necessary for their private sport; consequently they cared nothing for them. In the course of time, people, attracted by the rich soil, began to come in and cultivate, for which purpose they cut down the forests and established villages. But already aboriginal tribes, whose early history we cannot stop to trace, even were it well known, had established themselves in the forests; they lived by hunting and wood craft, and cultivated by cutting down and burning areas of forests, taking one crop off the virgin soil and then migrating to another tract, where they repeated the same process*. These forest tribes usually occupy the hilly regions; and also the villagers below used to go, unrestricted, into the forest, cut what they liked, and graze their cattle. Their practice was usually confined to taking what they wanted, but gradually, as the population increased in the plains, and the available uncut forest area was driven back, so to speak, to the hill slopes, the tribes and villagers in the better wooded tracts began to cut timber, bamboos, and to gather forest produce and take it *for sale* down to the plains. In a word, *without any distinct grant or license*, and without any idea of asserting a *right* as against the ruling power, or against other individuals or communities, everybody got accustomed to graze and cut in the nearest jungle lands, *because nobody cared whether he did or not.*

Now it is hardly necessary to point out that this does not constitute a legal or prescriptive *right* properly so called. Act IX of 1871 (section 37), which after all only affirms a general and a long known principle of law, requires that to constitute a *right* by prescription "the "right should have been peaceably and openly enjoyed by any person "*claiming title thereto* as an easement (servitude), *and as of right* with-"out interruption for 20 years."

Hence, while the forests were, and are still, over-run with people cutting and doing what they like, they are nevertheless, in *theory*, the absolute and unrestricted property of the State. And it is this circumstance that causes the practical difficulty. Government *will not* interfere in the matter, *until* the destruction of forests has gone so far that it is palpable to the most ordinary observer that the comforts of the people must cease, owing to the absolute cessation of the forests which supplied them. Then, with much reluctance, they consent to introduce some conservancy measures, and in common justice, the long used privileges have to be provided for.

In Burmah, where forest is still abundant (speaking generally and roughly), I have urged most earnestly that blocks of *village* forests should

* My readers will recognize the "jhûm," "dahyâ," "kumri," or "khil" cultivation of various parts of India; the "toung ya" of Burmah.

be set aside against the future day of the spread of population and before the denudation of the whole country. *Now* it would be easy to do so, and the restriction imposed would be very slight; but by the time forest lands become scarce, years of use will have made conservancy so familiar, that the people will have got to look on it as a matter of course. It remains to be seen if this proposal will come to anything.

I do not overlook the difficulties of the case; in the Central Provinces especially, they are great; the people there have before now decamped at a small alarm,* and whole tracts of lands once deserted have, after a short time, become so densely covered with jungle, and so infested with tigers, that the site remained unoccupied. The authorities look with fear, and justly so, on the chances of depopulation and loss of revenue, and consequently are ever suspicious of any attempts to conserve the forests and interfere with the people.

And we must not be too ready to condemn, though we must deplore, that vacillation regarding forest settlement, and that nervous feeling about complaints and dissatisfaction, which our present forest policy so markedly exhibits in most provinces. Everything has to give way to any outcry that is made by people, who are of course displeased by any restriction, however reasonable. In such cases, conservancy is always ordered into the back ground. This feeling is very natural. It arises really from the fact that the value and importance of forests are not *at heart* felt or understood.

Forests are not destroyed in a day; fires, grazing, and bad treatment, slowly work their way—a bountiful nature struggling with the evil all along, and only giving way inch by inch as it were; whatever evil effect is produced by denudation of forests it is gradual; rainfall does not stop all at once, nor does the climate change in a single season. Hence the case is not appreciated. If cholera breaks out or a famine is threatened, what activity do we see! Everything else is at once made to give way to the work of combating the evil. Why? Because the evil is immediate, pressing, and keenly recognized; but the evil of forest destruction is gradual, often indirect, and is certainly *not* keenly felt, all the common places of orders and reports to the contrary, notwithstanding.

"A happy and a contented population," it is said, "is better than flourishing forests. You cannot have both cattle and forests," (this was said in a recent Madras report,) "but then cattle are better than forests." Such phrases are everywhere common. Now, these propositions do not represent a true dilemma. The contentment of, after all, an extremely limited number of people, is not well purchased at the price of reducing the country to the condition of the Sahara, for the content will cease with the forests that caused it; a fine cattle breed is *not* well attained at the expense of denuding the hill ranges and the slopes whence spring the sources of streams and rivers; for, besides the other evils, if the forest ceases, you must either devote grain-producing lands to growing fodder, or your cattle will disappear. Forest denudation is as real (though less rapidly perceived) an evil as cholera or famine, and to avert it, measures must be taken, a fair and true balance must be struck between the liberty of the people and the preservation of the forests.

* *Vide* Central Provinces Gazetteer, Introduction, page XXI.

And the legislature *has to prescribe the principle on which this balance is to be struck.* There are two prominent considerations affecting the organization of the forest area in this respect. One of them is not necessarily connected with legislation; it is, that it is not possible, nor is it desirable, either for the people or for the State, to have all the jungle area, for example, of the Central Provinces and of Burmah, *kept* as jungle. How are we to arrive then at a knowledge of what we ought to keep and what we ought to let go? That is a subject unconnected with legislation, or rather with such legislation, as it is of any use to talk about in India, and one which forms a subject for separate consideration at this Conference.

The other is, that given the area of forests which you determine should be kept as forest, how are you going to effect a reconciliation between the interests of the population who have been accustomed, as a matter of hitherto unimpeded privilege, to get forest produce and grazing at their will and those of forest conservancy?

If you reply, I will regard only what are *legal rights* and knock all the loose and vague privileges on the head at once—I answer, that for any practical purpose, it is useless discussing such a proposal, because no one, either inside or outside of the Legislative Council, would listen to you; and we must hope to win our way by gaining people to our side, and be satisfied with the nearest approach to what is right that we can get.

In the Punjab (in the case of the jungle lands in the plains) and in the North-Western Provinces, in some forests, like those of Kumaon and Garhwal, the case stood so that it was found possible to secure large areas, perfectly free from all privileges as well as rights. In some places, again, the settlement officers gave over absolutely to the village communities (under orders of the State) an area of waste land to the extent of twice (or three times in many cases) the cultivated area. The *surplus* waste was then marked off as State property, and has been held ever since free of all rights. The people may do what they like with their own waste land and bring it under cultivation if they will, but that is their business.

MR. MCL. CAMPBELL.—The marking off of waste has often been done in the most unsatisfactory manner.

In Tanna district (Bombay Presidency) the people had their cultivated lands at the bottom of the valleys: then they required forest land for "ráb", *i.e.*, for obtaining branches, &c., to burn and manure their rice-fields: the next belt of forest was marked off for this purpose: then they said, we want grazing lands, so the next belt above that was marked off for grazing; and this left nothing but the bare tops of the hills, above all, to be marked off as forest; in apparently compact blocks it is true, but blocks containing nothing valuable. This demarcation was done by revenue officers, without the forest officer having any thing to say to it, and hence all the best forest was given up to "ráb" or to grazing.

In other places, the whole of the forest has been under a general sort of restriction by being made what is called "district" or "unreserved" forest, and only a small portion has been closed as "reserved forest," so that in one way or another provision always has been made for free forest produce to the villagers, and it must be regarded as a settled policy of Government to do so. The only restriction hitherto allowed is, that the Government has always retained and asserted the power of stopping these privileges absolutely in "closed" or reserved forests.

Here, then, we have one subject on which the present law is silent—the settlement of the forest area and of the privileges which it is the policy of the State to maintain. And this settlement constitutes one of the difficulties, if not the chief difficulty.

Another subject remains, the treatment of "*forest rights*" properly so called. Now it is obvious that these rights may be either 'defined' or 'undefined.' If A has the right to graze 10 cows, 5 buffaloes, and 20 goats, free from 1st July to 30th November, in a well-known local division of a forest, that is a defined right, and diminishes the value of a precisely known amount of forest by a precisely known amount of damage. But supposing his right is undefined, or only partly defined? In this case (which is *universally* the case in India) the right exists in a form which is unnecessarily injurious to the public without any corresponding benefit to the holder; *e. g.*, A has the right to graze cattle generally in an enormous forest, or A has a (partly defined) right to graze "cows" in the same place. Here it is obviously just that the State should have a power to define the right, and to determine how and where it is to be exercised, so that A may graze his cattle and yet the whole forest not be injured. A very good instance of these is afforded again by the Central Provinces, where people, who collect resin from sâl trees, do it so badly that they insist on girdling and killing the tree, instead of merely making incisions. Not only are the trees thus destroyed, but the dry timber becomes inflammable and greatly aids the forest fires which desolate the country.* If we have to deal with a mere definition of the right, or a regulation such as that as compelling the resin collector not to kill the trees, there can be no claim to compensation; but inasmuch, as very often the definition has to be effected by consideration of the average number of cattle A has had, and of how much land such a number of cattle *really requires;* this is in the nature of a restriction, and therefore the settlement is more correctly spoken of as a "regulation" of the right, and, if necessary, compensation has to be given. Sometimes it may be found very much to the benefit of the forests, and quite as good for the right holder, to transfer him to another area for its exercise; this is the "commutation" of a right, and power to do this for the safety of the public forests, ought, under proper guarantees, to be given.

So the "extinction" or buying out of rights is sometimes necessary. The law already contemplates the case by the provisions of the "Expropriation Act.' Why a special power is repeated in the Forest Law, I shall notice presently.

* I am told that this is not a right but a privilege, and has been stopped; but it will serve as an illustration of what I mean.

That some such action as this may be, in many cases, necessary, will not now be disputed, because it is obvious, as in the case of privileges, that you cannot either restore an ill-used forest, work an existing tract properly, or create a new one by plantation, or re-people one cut out, if without regulation or definition, everybody is to exercise rights over the forest.

2nd. Power to interfere to a limited extent with *rights.*

These matters must be regulated, and the law having provided the principle for settling with privileges "not being rights," must further determine the nature and limits of a proper interference with *rights* properly so called, whenever it is satisfactorily shown to be necessary for the preservation of the forests.

Before leaving the subject of dealing with rights, I have to allude to another class of rights, that also has occasionally to be the subject of interference. Suppose a private forest is situated on the slope of a hill, so that its sheltering mass keeps the valley below safe from landslips, avalanches, and falling stones, &c., which would mar the culturable land; here suppose that the private proprietor, in his eagerness to convert his slowly paying property into money which he can embark on a lucrative speculation, desires to cut down that forest;—he has a right to do so you say, because it is his; but the exercise of that right in such a way inflicts a tremendous injury on his neighbours: now it is maxim of the law, "*sic utere tuo ut alienum non lædas,*" and hence it is but right that the State should interfere with private property to the extent necessary to prevent the evil.

In such a case it is not to be expected that the State should buy the forest and pay a full price for it. The owner is bound, by natural equity and the principle of general law just quoted, to work his forest so as not to hurt other people. The State, therefore, need not compensate him for compelling him to do what it is his duty to do, *provided* it takes care so to restrain his action that he shall derive as great a benefit from his estate as due consideration for his neighbour's warrants. If the State should want to go beyond this amount of restraint, it must of course compensate.

DR. SCHLICH.—I consider rather that the Government should expropriate, entirely, forests so situated, on the ground that it is extremely difficult to determine with certainty whether the treatment of the forest in the manner contemplated by the proprietor would really cause the evil apprehended, and therefore the Government should take the responsibility of its own opinion and buy the forest right outright.

MR. B. POWELL.—I do not lay much stress upon the provision, but I think that the *principle* is in itself one that cannot be impugned, though there are cases in which the application would be difficult. I, however, apprehend that,

in practice, such a course never will be taken except in very clear cases, where the damage to be done by the removal of the forest is obvious. There are many cases in which it is not a mere opinion that damage will be done by the cutting down of forests, but a matter of practical or moral certainty. If, in any case, a proprietor considered that his cutting down the forest would not be productive of the evils which the Government officer thought it would, he could contest in a civil court the right of the Government to apply the proposed provision, and it would become a question of fact to be determined by evidence, whether there was ground to apprehend the evil or not. I admit, however, that the absolute expropriation would be in some respects advantageous, and certainly would be more popular.

Another instance of interference with rights, which is justifiable and necessary, is one which has received application in Europe, but is only in some cases necessary here.

I allude to the imposition of certain duties in connection with forest preservation and with other matters. Of the former, a good instance is empowering certain officers to require assistance from the villagers in the neighbourhood in extinguishing a forest fire, or giving notice of forest offences, or warning of impending danger to a forest, &c. In the Punjab, at this moment, the local law lays a responsibility on all villages in the vicinity of the hill forests in the case of a fire occuring.

An instance of the latter is compelling proprietors of up-lying estates to drain their property, so as not to allow the lower-lying property to become a morass, &c.; compelling riparian proprietors to so treat the banks of river as to prevent erosion and diluvion, or empowering the State to make the needful work and charge the estate or the community with the cost.

We are hardly advanced enough in India to require these special provisions yet, even if they could be introduced without opposition. The Punjab law about fires is very good; but in places where fires are an annual phenomenon, as they are in Burmah and elsewhere, it might be very difficult to enforce it justly.

There is yet another branch in which a limited interference by law with private rights is essential. I allude to the transport of timber and forest produce by land and water. This is necessary for several reasons: 1*st*.—The State undertakes the management of transport by rivers in Burmah and in India, because it is the natural guardian of these great highways, and because it is better able to do so than any one else; hence a system of *river police* is aimed at, and it is necessary, in order to prevent fraud, if for no other purpose, that the manner of floating timber, the marking of it, the detention and examination of it, the salving and collection of it, should be taken under special care. Owners of timber have to be compelled to pay salvage and other expenses incurred in

saving timber which has been preserved for them, and of course owners are prohibited from marking, as well as anybody else, or from interfering with the timber in the river. The river system aims at (1) preventing, and (2) punishing offences,—

(*a.*) *Of wrongdoers against proprietors.*

(*b.*) *Of one owner against another*, (as where he fraudulently tries to steal another's timber, transfer *his* marks to some one else's property, &c.)

(*c.*) *Of wrongdoers against the State*, (*e. g.*, infraction of laws for the protection of forest and against the rights of the State.)

Besides these, there is a revenue or fiscal object; *e. g.*, that of facilitating the collection of the State seignorage or royalty on the produce of its forests, and of levying a custom duty on forest produce wherever it is deemed right to impose it.

This subject needs attention just as land revenue and mercantile customs duty also. The State right must be recognized in the one case as in the other; if the state *lets go* its forest revenue, it does so at the peril of causing a deficit, which has to be made good by imposing other taxes on the people. Similarly, when the export is by land, it is desirable in some cases to prescribe that produce may only be taken by certain routes and imported and exported to and from certain ports, or stations, or depôts. This has the same object in view, and is especially needful as in Bombay, where the State forests are interlaced with private holdings, and persons cutting in the latter plunder the produce of the former, and carry it off safe, under color of its being the produce of a private forest; all this involves a limited interference with private right and liberty.

Now this settlement of forest privileges and this regulation and limited interference with private rights being conceded, how does our Forest Law, Act VII of 1865, deal with the question? Why, it quietly ignores the first subject altogether; and as regards the second, it deliberately declines to allow any interference with any private right whatever! I am aware that this would be enough of itself to condemn the Act without another word. But I would recall what has been already said about the incompleteness of its dealing with the one subject, it *does* admit, *viz.*, making special rules, and these defects, together with the detailed errors that I am presently to point out, call most loudly for a formal remedy by the repeal of Act VII of 1865. It is not merely that the Act is bad in itself, but my fear is that many of the rules made under it are illegal. With this Act, we are always standing on the verge of an explosion. The Burmah rules of 1865 were *full* of illegalities, not merely as regards the timber dealt with being the produce of *foreign* forests*, but as regards numerous other points. I have detected some illegalities even in the brief and incomplete set of rules for rivers, which I was compelled to submit to in the Panjab. The Bengal rules are legal enough to be described by one of our ablest Conservators as totally useless. The Central Provinces rules are also indifferent, and by no means free from defects of law. If any one was sharp enough to

* Act VII of 1869 remedies *this* defect, and possibly avails to remedy *all* defects against the law; but this position has been contested, and is by no means secure. If so, *all* that is illegal in the rules over and above the "foreign timber" question remains uncured.

raise the objections, which a careful study of Act VII would put a clever pleader in possession of, we should be very seriously embarrassed.

But some one will perhaps say, "The law is not so bad as you represent it; for, granted that it specifically declines any interference with private right, it uses the word '*right*' of course in a strict sense; and thus it leaves you free to effect a settlement of '*privileges*,' which appear to be much more common than cases of forest right". I reply, that though this distinction is undoubtedly correct, it is one that is sure to be overlooked by local courts administering the law; and in any case it is impossible that so important a question of State policy, as to *how* such privileges are to be settled, should be passed over without notice in a Forest Act. Some authorities should be vested with power to make a settlement on a certain basis.

And as to the omission of power to deal with *rights*, those rights are far too numerous and important, even if they constitute a less burden than the "privileges," to enable us to get on without a distinct power of defining, regulating, and commuting, and even of extinction, in cases where it is necessary. Still more necessary is it to guard against the non-interference principle in all cases regarding control of the transport, floating, and extraction of forest produce, to which I have adverted, in which its application in the fullest sense would prevent the action of the most salutary rules.

Defects of the Act, section by section.

But, besides these cardinal defects, there are, as I have already intimated, numerous others, and to these I will at once proceed. I will take the sections of the Act seriatim.

Cannot take effect till the forests have been *defined*.

In the first place, the Act does not make the slightest provision for extending any sort of protection to forest *until* the area has been selected and declared "Government forest." This term is of course a "term of art"—a phrase which has no meaning beyond the pale of the Act. The Act prohibiting any interference with rights, makes nothing the property of the State which was not so without it.

But the selection of the forests to which Government has a right, and to which therefore it proposes to extend a systematic management, is a work of time. During the whole of that period, then, the forest area is to be exposed to destruction, because it has not been defined and notified as Government forest.

The Burmah rules got over the difficulty by boldly notifying the whole province within certain arbitrary limits as a forest. These limits, it is true, were drawn so as to exclude the alluvial cultivation of the Irrawaddy valley, but they include a vast amount of ground that Government had no intention of applying any forest rules to whatever.

Government should have the power to protect any forest (to which it has a right) in the state in which it is, at once and as it stands, though of course a demarcation of the limits of the forest to be treated, should be taken in hand at the very first opportunity, so that by the time a special treatment was undertaken, and special measures for improvement inaugurated, the boundaries could be conspicuously and clearly defined.

Then, again, Act VII at Section I draws an awkward and unnecessary distinction between Local Governments and Local Administration (Chief Commissioners), the latter requiring to be specially empowered to act as a Local Government for the purposes of the Act, otherwise they cannot "make rules." As, practically, Chief Commissioners here alluded to, manage their forests with as much independence as Lieutenant-Governors, the distinction is needless.

Section I.—Distinction between Local Government and Administration.

Then follows the definition of forests which I have adverted to. You will observe (section 2) that if Government took up a large area of land which did not happen to have jungle or trees on it, say for the purpose of a plantation, such tract could not be placed under forest law till the plantation was complete, or, in other words, till it was covered "with trees or brushwood."

Section II.—Definition and notification of forests.

Then comes the section which tells us on what subjects the rules may be made.

The *first* set is aimed at forest conservancy, the *second*, at river management in connection with transport of forest produce, the *third*, by a curious set of non-descript provisions, at protecting timber partly in the forest and partly out of it, and the *fourth* set, at regulating the duties of officials.

Now take these *seriatim*.—(1) *The rules regarding conservancy.* These are to consist in a series of prohibitions to do certain acts. You may not injure trees—"growing trees"—the clause says. Why? If they have done growing or are standing dead, as hundreds are in the Cedar forest, may we not protect them? You may not collect minor produce, you may not trespass off "authorized" roads (whatever they may be), you may not cultivate, and you may not graze. But you cannot manage a forest by *prohibiting* everything, because the forest has got to *yield* as well as to be protected, and in order to yield and be kept yielding, it has to be *managed* properly.

The prohibitions, as far as they go, are all right, but nothing is said about regulating the extraction of material, requiring persons authorized to remove it by license or permit, to do so within a certain time under penalty of forfeiture, making them responsible for damage done, regulating the disposal of minor forest produce, grazing leases, working for resin, &c., nor is there permission for the rules to lay down anything about the principle of working, about fencing, fire protection, working plans, and the like.

It has to be remembered that forests are placed in the hands of the Government as a *trust*.

What do we do in other cases? Why, when Government has got a valuable collection of antiquities and of natural history specimens, it constitutes a Museum and passes *an Act* to direct the fulfilment of the *public trust*. But the forests are just as much a public trust, and why should the law not constitute the guardians of them in the same way, and vest certain local Governments and authorities with powers to make rules for requiring the systematic working and efficient maintenance (in a condition of permanent yield) of the forests?

Then as to the second head—*river* management. The defects are numerous. In the first place, we have, of course, to control *owners* as well as everybody else, which the Act does not allow, although the facts stare us in the face that certainly 50 per cent. of timber thefts, and probably more, are committed by people who are owners of *some* timber and to be on the river about their own timber business.

Persons unconnected with the trade are, of course, amenable to the ordinary law. What we want by a special Act, is a power to *prevent* the offences perpetrated by owners.

In the second place, it is immaterial whether the produce comes from Government forests or not, but the Act restricts it; then again people ought to be protected from being forcibly made to pay toll by riparian proprietors when their boats, rafts, &c., happen to touch the bank or get aground on the river bed; this is not dealt with. Nothing is said also about managing Government depôts of timber, so that all the rules in the Burmah rules about the Kado revenue station would be *ultra vires*, or at least no one would be bound to obey them; and nothing is said about Government fixing salvage rates and making people pay them before they can reclaim timber from the salvor, nothing about restricting the persons who were allowed to salve.* There is nothing about the detention of timber suspected to be the subject of some offence or to have been wrongfully obtained, and so on: indeed, it would be tedious to enumerate the various points in this way any further, and the best way of supplying the information is to offer a draft section to show what is wanted.

But one subject I must mention—the treatment of drift timber. All that the fourth clause says is, that the rules may "authorize the collection of drift timber and the disposal of the same belonging to Government." Now, if it belongs to Government, it *is* disposed of; for what else could be done with it? But that is not the real point at issue. We want to know when we may consider drift timber as Government property?

In other words, what we require is a distinct declaration of *primâ facie* right to all timber floating adrift without any one in charge, and to timber sunk, stranded, &c., &c., and to timber on which the marks are effaced. This right being declared, the collection and custody of the timber has to be provided for; and a certain time should be given and a procedure laid down within which, and according to which, claimants should come forward to establish their rights before an officer of experience in timber. If no such claim is made or established, then the *primâ facie* right of the State becomes absolute, and the timber may be sold. This is the way which it has been found in practice, is the only way of disposing of such questions. Giving a *primâ facie* title is the most satisfactory way of empowering the Government to collect and secure the material from waste, and also when the title becomes absolute it obviates all doubts about the title of a purchaser who buys at a sale of Government drift.

When the timber taken is marked, as is sometimes the case, very variously with a lot of marks partly effaced, in which case *two or more*

* Unless salving is a sort of collecting, in which case the rules restricting 'the removing of timber from the rivers' would cover the former.

persons will probably claim it, the forest officer should refer those parties to decide their right *inter se* in the Civil Court, unless they elect to abide by his arbitration, which in seven cases out of ten they would do.

In order to avoid such disputes as used to occur in former days in Burmah, it ought specifically to be provided that, while the timber is undergoing the process of identification, &c., it should not be liable to be seized by order of some court or other authority, who *assumes* that the timber is the property of some individual and directs it to be attached on behalf of the individual*.

I have also to add, that under the present law we have no means of disposing of the timber which is unclaimed, except by the cumbrous process of Act V of 1861, section 26, &c., which is all very well in the case of such property, as it was designed to apply to, *viz.*, articles which can be safely kept in a box or a warehouse, but which is very bad for timber, which must be left exposed to the danger of being carried away by flood, &c.

Export by land omitted altogether.

Then it will be observed that this fourth clause assumes that all forest produce is exported *by water*, and I do not know of any authority for the North-Western Provinces, Central Provinces, Berar, or any other rules where they attempt to regulate the export by *land*. Here we have what is called the "kham tehsil" or "naka" system. The purchaser obtains a permit to extract forest produce, or even extracts it in pursuance to general rule without a special permit, paying nothing at the time; but when the produce, whatever it is, goes out of the forest, it must naturally take some well-defined route [*e. g.*, the Dera Dhoon, where there are only certain passes over the Siwalik practicable]. On these routes toll-houses are placed, and every cart-load, basket, pack, coolie-load, bullock-load, or whatever it is, is stopped, examined, made to pay the authorized rates, and is passed on. In places where there is difficulty about keeping up nakas (as in Bombay), it is requisite to require the export to follow certain lines, and to prohibit the export or import of produce to certain bunders (places where boats land), stations, or depôts. All this, which represents a system widely in force in India, is ignored *in toto* by the Act. Power is required to fix and revise the rates, to provide a power of detention of goods, a power to prohibit evasion of the toll, by authorizing the seizure of the material and the levy of heavy additional duty, and a power of prohibiting export by certain lines or to certain places.

Third clause.

Then we come to the *third clause*. This contains rules for the "safe custody of timber," the applicability of which I do not appreciate, as the subjects of the rules are partly (1) the prohibition of cutting up the timber—"converting it" as the Act calls it, and partly (2) property marks. Now, we regulate the "conversion" or sawing up of timber with two objects: one is to prevent people turning the forest into a timber-yard and doing damage to the young growth by locally converting the timber without

* It is perfectly immaterial whether the Court is right in the assumption or not. The principle is simply that one authority should not interfere with the due procedure of another authority till the procedure of the first is lawfully at an end.

permission; the other is to prevent evasion of timber duty or royalty as well as other kinds of fraud, as when a contractor who has undertaken to launch logs burns a dozen or two to save trouble, and swears that he has put them in the river, &c. &c.

Now, as far as the protection of the forest goes, the subject should have been treated under the first clause. As far as it relates to the protection of timber, whether for the benefit of its owner or for revenue purposes, the Act, you will observe, only prohibits the converting, burning, selling, &c., of such timber as is the *produce of Government forests*, so that you cannot protect any timber which happens to come from a foreign forest, or a Raja's estate, or a communal or private forest; and still more absurd: *the owner* cannot be prevented touching the timber, so that if in Burmah (unless the thing was settled as it is by contract of the parties) a timber owner brought down (from Tonghoo to Shoaygheen, let us say) a lot of timber, on which royalty at so much per log was due and payable *at the latter place*, you could not prevent him, by any *rule*, from selling, cutting-up or burning all his timber before it got to Shoaygheen, although his so doing would render the levy of the royalty, &c., almost or quite impossible.

Property marks.

So much of the clause 3 as relates to 'property marks' is good enough, except that as usual the *owner* is excepted. Now, in order to protect timber in transit, it is desirable to prevent *any one* marking it at all in certain limits, and owners especially, for it is these people who, under pretence of going down and marking their *own* timber, take the opportunity of effacing the marks on and "super-marking," as it is called, other people's timber.

Here, again, it is not enough to prohibit the *use* of a mark in these limits; you must prohibit the possession, carrying, or using implements for effacing, marking, &c. In the sections of the Indian Penal Code relating to coining, this is done; and why? Obviously because you can rarely catch a man in the momentary act of striking or applying the coining tools any more than you can marking tools; but if a person has the things in possession, what can he have them for but for an illegal purpose?

CAPTAIN LEWIN.—There would be a difficulty, however, about prohibiting the carrying of marking tools, as the term might include an axe, a chisel, or a "dah" (knife).

MR. B POWELL.—Yes, these of course cannot be included; it must be restricted to marking hammers and to tools whose *primâ facie* and obvious use is in timber fraud. In Burmah, bags full of tools have been found, wooden hammers, with the edges of the embossed letters covered with tin or copper to harden them and enable the impression to be made on the log, scrapers to remove the old mark, and little combs for producing a natural appearance of grain, over the spot where the first mark has been erased. I had such tools as well as marking hammers in view, when I wrote

as I did; but of course I would not apply the rule to tools whose use was *primâ facie* for other and for lawful purposes.

The *registration* of marks is not sufficiently provided for; it is necessary not only to register, but to *prohibit* the registration in the case of certain classes; also to prevent registration of more than one mark, &c.

Duties of Government Officers.

The *fourth clause* is not free from doubt, as to whether a village headman, "patel," &c., can be dealt with under it; otherwise it is all right.

The levy of *duty* on foreign or private forest produce is not mentioned in the Act, nor is there anything about the levy and recovery of revenue or royalty on Government timber. It is important to regulate these matters and to provide for the lien on and first claim of Government on such produce for duty, &c. Supposing, for instance, 100 logs of timber are attached before duty is paid and sold in execution of decree of court against the owner, has Government a lien on the logs to make the vendee pay? and is the duty a first charge on the logs to be paid out of the sale proceeds before the decree is satisfied? Obviously it ought to be.

Penalties.

Then we come to section 5, which provides a penalty to be applied in cases when confiscation is not provided in the Act.

Now, this exception is probably due either to inadvertence or to considering only the *general* meaning of the word "confiscation" without reflecting what it amounted to under the Act.

Confiscation is applied to taking away (1) tools and implements used in committing a forest offence, and (2) to the produce obtained. It is obvious that (1) is real confiscation; it deprives the man of his property, and therefore is a penalty; but the penalty is in most cases extremely slight, for it is questionable whether a cart, a pair of bullocks, a boat, or an elephant, used in transgressing forest rules, are implements, and if not, they are not liable to confiscation; if they *were*, the punishment would be sufficient; but, as it is, the only thing that is confiscated is an *axe*, or such like, in fact a penalty amounting to a loss of a few annas or half a rupee.

And this confiscation is *compulsory*. Perhaps my hearers are not aware that by the law as it now stands if you see a man cutting a fine teak tree, which is perhaps worth Rs. 200, and is in a position that renders its retention peculiarly valuable and important, you *must* confiscate the axe worth 8 annas, with which he is cutting the tree, and you *cannot* then get any other punishment imposed! As to the second kind of confiscation, the produce, it is obvious that this is not really confiscation at all, for it is merely taking out of the wrong-doer's hands the material which is in fact stolen property. When after a trial for theft, the court orders the watch or the bracelet to be restored to the owner, it is not said to be a "confiscation" of the watch or bracelet from the thief, but the Forest Act calls it so in the case of stolen timber.

Hence, this confiscation is no punishment at all in *forest* offences, and only becomes so when you take away a man's own timber for infringement of some rule.

The arbitrary restriction of the punishment to fine is also a defect. Imprisonment should be optional. The timber cases that occur in Burmah are not capable of being dealt with by fine; the offender will gladly pay his Rs. 500; but the fear of imprisonment, even for a few days, would deter him far more.

Power of arrest.

The section 8 gives the one satisfactory power in the Act, and must be maintained in a new law; arrest without warrant is *absolutely essential.* In all timber cases you cannot, do what you will, keep the issue of the warrant secret; and the moment it is known, every trace of the crime disappears like magic.

Section 9 fully prevents any oppression from an arrest without warrant, but the section says nothing about bail or recognizances; the omission has to be supplied.

COLONEL PLAYFAIR.—The power of arrest without warrant will, I think, need consideration.

MR. B. POWELL.—No doubt the power of arrest without warrant presents certain difficulties. On the one hand, the power, as expressed in the formal wording of a section, looks formidable, and it seems an extreme measure to allow a subordinate police or forest official to arrest without warrant a man committing any offence against the Forest Rules, however trivial. On the other hand, this provision has actually stood on the Code for nine years, and its operation in practice has never been found productive of any oppression, and it would be perfectly impossible to punish a forest offence if the police or forest officer seeing a breach of the rules committed before his face, were unable to take any action till he had obtained a warrant from a Magistrate, perhaps thirty miles distant. Probably, what the Act contemplated was, that the officer catching an offender should at once detain him and take him before the nearest Magistrate, who would determine whether the offence was such that he ought then to be put in custody and placed on trial.

MR. RIBBENTROP.—I would propose to limit the power of arrest to persons caught within the bounds of the forests.

MR. DRYSDALE.—It is just as common to find a man on a road or outside the forest with stolen timber or forest produce in his possession, and there is no more reason why he should be exempted from arrest than the other.

MR. MACLEOD CAMPBELL.—I suggest that the best provision would be that of the Railway Act, which empowers an arrest without formal warrant only in cases where the

offender's name and address cannot be satisfactorily obtained, either because the man refuses to tell his name or because he gives a name and address which are false.

CAPTAIN DOVETON.—I consider that the power of arrest without warrant might be restricted to certain classes of offences of graver character.

After some discussion as to how the classes of offences should be specified, it was generally agreed that the power of arrest without warrant, as in the existing law, should be maintained in all cases of infringement of the law regarding transport of forest produce and in cases of wilful mischief. But in all other cases the power of arrest was to be limited to offenders whose name and address could not be ascertained.

MR. B. POWELL.—The provision of the law which renders vexatious or unnecessary arrest punishable is a sufficient deterrent to over-zealous officials.

Some conversation then ensued on the difficulty of proving forest cases, and MR. MCKEE observed that Magistrates, and especially Native Magistrates, often declined to accept the unsupported testimony of a forest official who declares that he caught the accused "*flagrante delicto.*"

COLONEL PLAYFAIR.—By law it is not necessary that more than one witness should be produced, but it is a question for the Magistrate whether to accept the evidence of the one as credible.

MR. RIBBENTROP.—By the German law, if a forest officer states on the oath of his service that he has taken the accused in the act, or himself witnessed the offence, the burden of proof is thrown on the accused to prove his innocence; such a law, however, could not be applied in India into the class of subordinates that we have at present.

MR. VINCENT.—The penalties should be greater, as in the German law, when the offence is committed between sunset and sunrise, than between sunrise an sunset; and also when the culprit is provided with all the appliances of the wood-cutter's craft and carries on the stealing of timber systematically.

MR. WILD.—A power of search for concealed and stolen timber and so forth is required. Provisions similar to those

which are legalized by the Customs Act would be probably applicable.

Section 10 is unnecessary: it is quite sufficient to apply the Indian Penal Code definition of abetment, which is probably what is meant.

Section 11—the "officer empowered" is a magistrate, and therefore the words are surplusage; besides, it is unnecessary to define such terms, the Criminal Procedure Code does all that.

The procedure in this section is not sufficiently clearly laid down, and it would be well to set at rest all doubts about an appeal. Section 13 clearly to my mind means, that if the Criminal Procedure Code would allow an appeal in a confiscation case, such appeal is to be heard accordingly; but does the Criminal Procedure Code contemplate this class of cases at any rate directly?

Section 15 is unnecessary, as the general law of pardon is sufficient and is applicable.

Section 16 is repealed, and section 17 is unnecessary; such matters settle themselves; a man who steals a loaf worth six pice is, under the Penal Code, liable to be tried after an indefinite interval, may be twenty-years; but in practice such matters present no difficulty; on the other hand, to lay down a stringent rule does: it may take nine months to discover an offence, perhaps a very grave and intricate timber fraud; is it wise then to prohibit the prosecution? but the Act does so.

Such are the main and prominent defects of the law, and I believe that a minute examination and a more fastidious disquisition would discover many others.

Now, let me glance a moment at the history of the Act. It is soon told. In 1863-64, the Chief Commissioner of Burmah sent up a set of rules to govern the Burmah forests, but considered that unless the legislature interfered, such rules could not become valid. The Central Provinces also had sent in a set of rules. It was thought right to pass a general Act not merely legalizing those rules, but giving similar power to all local Governments.

In those days the North-Western Provinces and Oudh had some old rules, which went on the basis of simply declaring certain forests to be conserved, and then saying that any one who transgressed the prohibition in those forests would be treated as guilty of theft, mischief, &c., under the Penal Code. It was objected that, considering that people had been always in former days *allowed* to go and do what they pleased in forests, it was rather hard suddenly to announce that such acts were theft and mischief, and hence it was deemed desirable to put the prohibitive rules on different basis*. Mr. Brandis thereon drew up a report, in which he explained what were the requirements of the rules—to legalize which, the Act was to be passed—and what were the subjects which should be dealt with to make the Act of general application.

* I have already alluded to the considerations rendering special rules for forests necessary.

That that report did not explain all that was wanted, no one could be now ready to admit than Mr. Brandis himself, and it must be remembered that this report dates ten years back, since which time we have gained experience, seen numerous rules drafted and amended, have been able to watch the working of them and find out their practical defects: all this was not possible ten years ago. But still, had the "report" been really understood and the Act framed on it, no doubt the law would be avoided many of its present errors and deficiencies; but it was quite clear that the Act was drafted by a lawyer who had no adequate conception of the subject or of its requirements, and this is not to be wondered at.

If it were not for fear of lengthening this already tedious papers, I could point out in making a comparison between the Act and the Report how the objects of the latter has been misunderstood and overlooked.

Mr. Brandis's report distinctly contemplates the regulation of obnoxious rights, compensation being given when necessary; it speaks in much wider terms of the export of timber and the control of marking, and it makes no allusion to the restriction of penalties already alluded to. But these things and many others were overlooked or misunderstood when the draft of the Act was made.

Ten years of work have, however, placed us in a much better position to make laws than we were in 1865. We now know pretty well the real principles of what we want the law to lay down. If it is asked, whether ten years hence we shall not know still more? I reply, we should certainly, not know more of what constitutes the *basis* of a good Act than we do now; we shall, it is to be hoped, know far more of forest treatment, climate, soils, means of reproduction, and artificial production of trees, and we may require to add to the law some further refinements and some further restraint or control over private forests and estates than at present it is desirable to propose; but time will not change the general basis of legislation in regard to settlement of forests with their privileges and rights, and determining the main features of their working and preservation. At present, therefore, we are quite ripe for the issue of a simple general code. Besides this, it is quite impossible to go on any longer with our forest law in such a state as it is at present.

I would not propose, however, to issue a code quite in the form of that proposed by Mr. Brandis and myself. We have received the opinions of all local Governments, and objections have been raised to that draft, which I consider it possible and indeed necessary to obviate. It would be inconvenient to lay a new code before this conference, but I shall hope to submit a new draft modified to meet the objections that have been raised. My draft would be considerably shorter.

First, I would define "forest" so that it should include all that is denoted by the well-known vernacular term "jangal," and forest, whether natural or artificial, but would exclude cultivated land or land absolutely free from trees and jungle, *unless* such land has been taken up and notified in the vicinity (as forest). In other words, let the Act apply to lands which every child can recognize as forest or jungle within the common meaning of the word, and to such other lands as you

specially warn people that you intend to treat as forest or make into forest, though they do not appear at present to be forests or jungles.

After such other definitions as are necessary, I would proceed at once with the organization of the forest area. The first step is to settle the *boundaries* and demarcate accordingly. Now the boundaries may be either (1) disputed owing to the contract of private estates, or (2) may require to be determined, not on account of neighbouring claims, but simply on account of the necessity of determining whereto the forest shall extend, and up to what limits grants to clear and cultivate, &c. may be made. It is said that in the case of settlement of boundaries, Act I of 1847 does very well. But Act I of 1847 is now repealed, and it did not itself contain the law in the case of *disputed* boundaries, but only referred to certain regulations of 1822 and 1833, which are inaccessible and rarely to be obtained for reference. The only thing the *Act* did, was to provide for the maintenance of boundary marks.

Still the general principles of the Act as repeated in the new North-West revenue law, are excellent, and should be adopted.

In fact, the distinctive feature of the Forest Code, I propose, is, that the first organization of the forest area should be effected by a settlement as in the case of land revenue, and that a "misl," or record of such settlement should be formed and be used as a settlement record is. The "forest settlement" consists in determining the boundaries as already intimated, and then in settling all questions of *privileges* and rights, and in determining to what class the forest shall belong as regards its use and treatment.

The settlement must be effected in all cases by an officer, usually a land revenue settlement or *experienced* civil officer, who will be deputed to the work. The forest officer will indicate what *he* wants from a forest point of view, and the civil officer will see how far these requirements can be met. If the two officers differ (which in the Punjab, where the system has been in force with excellent results, I have *never* known to be the case), a reference to the Conservator of Forests and to the chief revenue authority will easily settle the difference. But it will some time happen that the civil and other officer, whom I shall hereafter call the "forest settlement officers," agree, but some private owner or community holding the adjoining estate disputes the boundary, then I would apply an arbitration exactly in the way provided by the North-Western Province revenue law, sections 220—231 inclusive. And this principle of arbitration I would apply to all questions of compensation for the treatment of forest right for managing those anomalous cases where the *soil* is not the right of Government, though its perpetual use *is*, in fact, for all cases not being ones of simple out and out expropriation, to which Act X of 1870 naturally applies.

This will surely meet the approval of all classes of objectors to the old bill, as I sweep away the whole machinery of commissions, appeals, &c., &c.

As regards *boundaries*, I may here mention that I would impose on the State the duty of maintaining marks in all forests except those presently spoken of as "village or district forests," where the

community should do it, as those forests are for their benefit, almost if not quite exclusively.

Boundaries being settled, we have then to determine the procedure of demarcation, which will be different according to the class of forest, and to strictness of preservation which the class requires. It will vary from perfect and substantial demarcation in one class down to mere indication of natural boundaries in another. Wherever pillars or marks have to be put up, this is done at the time of settling the boundaries, *viz.*, usually temporary pillars will be put up at the time, so that there will be no difficulty afterwards in converting the temporary marks into permanent ones.

It will then be determined that the forest shall be taken into one class or another, *viz.* :—

1.—Special Reserve.
2.—Ordinary Reserve.
3.—District Forest.

Special Reserve will always be made out of forest which is the property of the State, whether encumbered or not with *rights* strictly so called. It will be the very valuable forest destined to produce timber, fuel, &c., for the market, as its primary object, and will often be too small in extent (relating to the whole area of the province) to suffice for climatic purposes; it will be that portion of forest which the State designs to admit to a high cultivation.

Ordinary Reserve will be an additional area, in which privileges as well as unavoidable rights will be allowed when settled or permanently stated, and which is designed to supplement the climatic effect of the otherwise insufficient area of special reserve.

District Forest will be forests made over absolutely for the use of villages and communities.

Each class will demand its own settlement, and, as before said, its own degree of completeness in demarcating boundaries.

In "special reserves" it will be necessary to refuse all privileges; and if, owing to exceptional circumstances it is necessary to allow such, they must all be defined, must be exercised under supervision, and strictly confined to certain limits.

Rights will have to be defined, regulated, commuted, or extinguished as presently mentioned. Demarcation will have to be very complete and permanent.

All plantations will be special reserves. Any land taken up absolutely, will be so under Act X of 1870.

But, supposing the tract is one in which Government has already the right to preserve the *trees*, in such a case Mr. Brandis's bill proposed to allow Government to acquire it on easier terms, and this was objected to in some opinions, notably Captain Wace's, on what I must consider to be a misunderstanding of the case.

The right of Government is perpetual, consequently the value of the soil with which the theoretical owner is unable to interfere until no single tree remains on it, is really nothing; in this case it seems unreasonable that the same formidable procedure should be gone through to secure the right which is of so little value to the owner,

as in the case of richly cultivated or building lands, the value of which is immediate, unrestricted, and progressive. It will, in my opinion, be quite sufficient to allow the "Forest Settlement Officers" to fix the compensation, which in most cases will be done by an exchange of lands, and allow an appeal to the Commissioner to settle it if the parties are dissatisfied.

COLONEL PLAYFAIR.—I think the procedure for determining compensation under Act X of 1870 is just as simple as that proposed; if the Commissioner has to hear the appeal and decide the amount of compensation, he would most probably require the aid of assessors, and that is practically all that the Act requires.

In "ordinary reserves" rights, as a rule, would not require to be bought out, only defined and recorded. Privileges may be allowed to all neighbours; but such privileges must be recorded in precise terms, and so arranged that portions of the forest are opened in rotation to their exercise, or otherwise as the general plan of working may require.

Privileges wherever allowed, should be always for the local and personal use of the community or individual, not for the purpose of sale, export, or mercantile profit*. A general kind of demarcation will be sufficient, such as the settlement officers recommend under the circumstances of each forest.

In *district forests* the settlement will merely state the villages, individuals, or communities to which the forest is assigned; will not insist on its demarcation unless specially necessary, or will merely describe the limits. The settlement will also prescribe that portions may be closed, on a general scheme prescribed for working and treatment. No compensation will be given for closing blocks, because such closing is done either in the interest of the right-holders and privilege-holders to maintain the production of the material for their use, or to keep up the forest, which cannot be done without it.

Then will follow specific provisions as to *rights* properly so called, to which I now proceed.

It certainly should be declared that no new *forest rights* of private persons or communities are to grow up in any Government forest of which a settlement has been made under the Act. That is fair, and indeed it is a provision not objected to by any one in the draft bill of Mr. Brandis.

Then we have to find out what the *existing rights* are. A notice will be issued, calling on people to assert their rights; of course, numerous people will assert rights that are really privileges, and if the officers are satisfied that they are so, then they will. deal with the case under the head of privileges.

* This provision gives rise to some discussion on the Bill under Section 27, but really the bill confused (for this I am to be held responsible,) *rights* and *privileges*. If it is a privilege, the condition can be annexed, and is annexed in all existing rules, North-Western Provinces, Central Provinces, and Bengal. If it is a question of *right*, and the right is in itself transferable, you must alter it except under power of expropriation, &c.

The notice to claim may allow six months, with a proviso that on cause shown claims may be admitted afterwards. This will enable all claims to be sent in before the settlement officers come round; most of them can be submitted in that time, and no doubt if any claim comes in after the settlement is over, why then it can be specially provided for.

All rights, when finally settled, will be strictly defined and recorded and kept on the "misl."

Then will come sections empowering the regulation, commutation, and extinction of forest rights on payment of full compensation, as in section 29 of the bill.

And I should also maintain section 30, specifying in what the regulation, &c., is to consist. This subject includes also the closing of unnecessary tracts, roads, and pathways.

The "Forest Settlement Officers" will state the rights as they are proved to exist; will state what they propose to do, and the sort of compensation they propose to give. If the people concerned, after receiving notice (just as in Act X of 1870), consent, their consent will be recorded, and form part of the "misl." If not, then what is to be done? Mr. Brandis's bill proposed a commission, and this is so much objected to that I abandon it at once; some urge that we should abide by Act X of 1870. This is all very well, and it is true that the Act does mention "rights," *i. e.*, "benefits arising out of land," which it declares are included in its definition of the term "land." But I appeal to any one who had anything to do with that Act being passed, whether the legislature entertained the idea of applying it to cases like that of settlement of forest *rights*. If in arranging to buy a forest out-and-out, or acquire a plot of ground for a plantation, of course apply it; but to a settlement of *rights*, is it likely that the Act will really work well in a case to which no one ever thought of its being applied?

I would say, keep the spirit of Act X of 1870, but repeat the provisions as properly applied in this Forest Act, so as to leave no doubt on the matter, and make the law complete in itself.

COLONEL PLAYFAIR.—My opinion is, that although Act X of 1870 does not directly contemplate the treatment of such cases as compensation for forest rights, still the procedure could be applied, and it could be merely necessary to substitute for the Collector, who proposes the compensation in the first instance, the settlement or other civil officer, who was engaged in regulating or extinguishing the right.

MR. B. POWELL.—I quite agree. I do not want to alter the spirit of the law, only to repeat the provision with the necessary verbal adaptations and not leave the subject in doubt.

Thus we have a complete settlement of our forests. I would give the settlement record the same value as evidence as is accorded to a "land revenue" settlement.

Two provisions have to be inserted to close this section. One is to provide for the Government taking charge of private forests in the manner of section 42 of the Bill. The other is to provide (this is Captain Wace's suggestion) that private owners may, if they like, submit their forests to Government, required for their own benefit, after paying expenses.

I would also here insert a provision that forest estates under the Courts of Wards are to be managed by the State forest service.

As regards compensation for interfering with a private owner on the management of his estate, I have already indicated the principle, and to that I adhere.

DR. SCHLICH.—I have already expressed my views about interference with private forests, and wish to see them expropriated altogether, if found necessary to interfere with their management; but this need not be done in the case of communal forests, as communities have public duties of a nature different to those of private individuals.

MR. BIRNIE BROWN.—In many instances the communal character of "shamilat" forests is being gradually lost by the usurpation of individuals, but in other cases, by settlement record, the right to the produce is vested in the "lumbardar," or headman of the village community.

MR. B. POWELL.—Great care should be taken to maintain the communal character of the forests, and to see that the right of the community is not usurped by one or more individuals.

I omitted to mention that in all cases of expropriation of rights or of the entire estate, the Government must have the option of withdrawing if the price fixed is too great. Why this should not be done in the case of any expropriation, I cannot see; but in forests it is especially necessary, or the Government might be compelled to expropriate a right which really would be not *worth* the sum paid.

If I want to make a railway or build a fort, I have made up my mind that the work must be done, and therefore I am made to stick to the bargain; for I cannot, as a rule,—that appears to be the idea—abandon my fort or my railway the construction of which at almost *any* price is deemed necessary, and therefore I cannot get off buying the land after it has been finally notified; but surely the case of forest or forest rights is different, since I do not interfere with any proprietary right or alter the right holder's position or prospects in any way.

COLONEL PLAYFAIR.—In my opinion there is nothing in Act X of 1870, as it stands, to prevent the Government withdrawing from the expropriation, provided it has not availed itself of the special power of immediate entry and occupation provided by the law.

CAPTAIN DOVETON.—At any rate the subject is open to doubt, and therefore it is wiser to specify the power of withdrawal.

CAPTAIN LEWIN.—I fully concur in the principle of effecting the forest settlement contemplated as the basis of operations, and consider that it should be expressed that the Forest Department will bear the cost of the settlement.

MR. B. POWELL.—The question of who is to bear the cost of the settlement is not a point which the Act would deal with; but if it would lead to a more general approval of the principle laid down, it certainly could be agreed that the cost could be borne as Captain Lewin proposed.

Having then, by the aid of the settlement, and the provision, connected with it, "got the forest," what are we to do with it: Well, we have got to (1) protect it* by prohibitions†, and by laying responsibility on certain classes, to prevent or aid in the suppression of dangers and calamities; (2), to treat it properly, so to maintain it in the state in which it is most permanently beneficial; and (3) to see that its material is properly worked out either

(*a*) by Government agency,
(*b*) or by agency of purchasers.

Under these three heads I propose to empower local Governments and Administrators to make rules according to circumstances.

Next, I will devote a chapter to the export of timber, the protection of timber in transit, and the sale of timber at Government depôts.

This divides itself into two general heads—

(1) Export by land; (2) export by water.

These will also be settled by provision for making local rules.

For the 1st, there must be a regulation of the "Kham tehsil" and "Naka" systems, whereby forest produce removed is covered by passes, which are examined at certain stations and made to pay royalty, &c., or duty may be charged on foreign or private forest produce, &c., &c.

For the 2nd, we have the whole river system and the control of timber; its salvage, collection, examination, detention in case of suspicion, charge of duty, lien of Government for duty and royalty, management of depôts and for storing, regulation of timber marks, collection of drift timber, settlement of claims thereto, keeping clear the water-way, &c., &c.

* I have here to point out that we shall have to provide for pounds and cattle trespass either in this part of the Act or under the Penalty chapter. The Act I of 1871, the existing law of cattle trespass, was made without the least idea of the requirements of forests. This is obvious, for the scale of penalties for cattle is fixed by *law*, and does not acknowledge the relative injuriousness of the different kinds of cattle—1*st* is the camel; he is the worst beast of all—2*nd*, and scarcely inferior, is the goat; next is the sheep; next, the buffalo, whose heavy feet do so much injury to the soil; and last are cows and oxen. The Trespass Act almost reverses the order.

† These have hitherto neglected the protection of *birds*, which kill wood-eating insects.

Some of these matters will have to be entered in the Act itself, the rest can be provided for by local rules, which will control British and foreign timber alike, and owners as well as other people.

The Burmah river rules, now elaborated, will serve as a guide; the system there is so comprehensive, that provisions which will legalize what is required in Burmah, will be found to cover every possible provision required in any part of India.

MR. MCL. CAMPBELL.—Government are sometimes apt to look with disfavor on special provisions for timber business, apparently on the ground that, if Government acts as timber trader and gets special provisions in its favour, it is like helping one trader to the disadvantage of another.

MR. B. POWELL.—But the Government takes up the trade, because it is found *impossible* to leave it in the hands of private individuals without ruin to the forest; therefore it is right that the State should make the best regulations for effecting its purpose.

The State monopolizes, for instance, the right of carrying letters, and undertakes in some instances the functions of the "common carrier." In all such cases it makes special protection for itself, and rightly so.

Moreover, it is not strictly correct to place Government, as disposing of the produce of its forests, on the same footing as a private trader. For, Government realizing its produce adds to the revenue, and *pro tanto* relieves the public from other taxes, which is a totally different thing to private trade for the benefit of the individual.

But the chief part of timber regulations are concerned not so much with the realization of revenue, but with the suppression of, and prevention of timber frauds, which results in the protection and encouragement of timber trade generally. Objections, therefore, of the sort mentioned, are not well founded.

CAPTAIN DOVETON.—I think another subject has to be provided for. Often the Forest Department makes roads at its own expense, which become very useful to the general traffic. It seems very fair that when roads, which are exclusively forest roads, are so used, that power should be given to levy tolls, so as to furnish a fund for the up-keep and repair of the roads; in short, that the public should contribute to maintain the work which serves their convenience.

Lastly, a chapter will be devoted to penalties to power of arrest, to prohibition of forest officers trading, &c., confiscation will be provided for, and the procedure laid down.

The penalties will also provide for the removing, erasing, and damaging boundary marks, just as in the North-Western Province revenue law.

All this will be provided for in a bill, which will be about half the length of the draft bill, and will meet all the objections which have been offered to the draft, in all cases when such objections have not been specifically reported.

It only remains for me to submit a draft bill, which I shall do on these principles, subject to such corrections as the discussion of the subject at this Conference will lead to.

SUBJECT II.

THE RELATION AT PRESENT EXISTING BETWEEN CIVIL AND FOREST OFFICER'S. PROPOSAL FOR RE-ORGANIZATION.

CAPTAIN LEWIN.—I should like to bring forward a subject which, though not previously announced as a subject to be taken up at this Conference, is so essentially connected with the organization of the forest work, that I think every one present will agree in admitting it to discussion. For the purpose of initiating the discussion, I will place before you my ideas in the form of a categorical proposition. . It seems to me, especially in districts of the wilder sort where the people are more especially subject to personal influence, and where the major part of the country is forest land, that the forest officer ought to be directly under the district officer; that the Assistant Conservator should occupy, in reference to the Conservator of Forests and the district officer, a position precisely analogous to that held by a District Superintendent of Police in reference, respectively, to the head of his own department and the head of the district. It is only by some such measure as this that the district officers will be able to maintain the influence and position in the district which they should hold. The transfer to the Forest Department of the rights to grant leases of grass lands, to confer grazing and wood-cutting privileges, to forbid the cultivation of "jhoom" cultivation, and would, *de facto*, convey to the forest officer an amount of authority over the people of the country such as could not but be viewed with apprehension by the administrative head of the district.

COLONEL PLAYFAIR.—In the Central Provinces the effect of the present system is, that while a large area of forest is under the district officer, he has no means of officially obtaining advice or assistance regarding the management of his forests from the forest officer. It is true that he can ask it as a favor, but that is obviously insufficient.

CAPTAIN DOVETON.—But forest officers would always be glad to give their assistance.

COLONEL PLAYFAIR.—Yes; but that makes it dependent on the good-will of an individual officer, and no effective

system of organization can be made dependant on such a contingency.

MR. RIBBENTROP.—In all revenue matters and questions regarding the management of the people the forest officer should be under the district officer. I think that the unreserved forests should be under the Deputy Commissioner, and the reserved blocks entirely at the option of the Forest Department to close portions against grazing, &c. In short, all works connected with utilization, reproduction, and management, should be under the Forest Department, and other questions under the Civil Department.

MR. MCKEE.—But, perhaps, when the district officer required the services of the forest officer, other work connected with the departmental forests might require his presence elsewhere.

MR. B. POWELL.—If the work was organized as Mr. Ribbentrop proposes, there would be no need for any distinction between district and departmental forests. All forest area would be on the same footing, only that some forest would be reserved, that is, given up entirely to strict management, to the exclusion of all privileges (with which the district officer is most concerned), and the rest would be unreserved, that is, open to the exercise of those privileges. Practically, therefore, the district officer would require to say very little to the former class, and be chiefly interested in the latter; still, questions might arise in both classes of forests which would require the interference of the district officer, such as the collection of the revenue, the settlement of disputes, and the punishment of offences. We want to have the whole power of the district brought to bear on the conservancy of the forests instead of against it, as it, is in some districts. I have known instances of district officers who have warned all their native officials to be very careful to suppress what they call oppressions on the part of the forest officials. What is this, but simply letting it be known that the district officer does not wish to have any one punished, no matter what forest offence he commits; at least, that is what the tehsildars and native police officers instantly understand by it. The forest officer, instead of receiving assistance from the district officials, is snubbed on every possible occasion, and finds himself powerless; all this *must* be remedied.

MR. J. CAMPBELL.—Formerly, in Bombay, the district forest officers were entirely under the Collector. The Conservator was only the adviser of Government, and inspected works so as to enable him to give advice; he could also advise the Collectors. But the whole force of the district was on the side of the forest work.

DR. SCHLICH.—What change was made?

MR. CAMPBELL.—The Collector in Bombay has a very large charge, more like a Commissioner in Bengal. There is a ryotwarry settlement and a series of officials who deal directly with the individual proprietor from the lowest to the highest; all could, therefore, co-operate in the work of forest conservancy. The change came through Mr. Dalzell, who said that the Conservator had no power and no responsibility. The Government made a new plan. The responsibility was transferred to the Conservator, and he had to issue orders to the forest executive officers only through the Collector. The Collectors thus became mere 'post offices,' and lost all interest in the work and only antagonism arose instead of co-operation. When I was leaving Tarna, I recommended the old system should be restored, with the Conservator as directing officer in professional matters.

MR. RIBBENTROP.—Was there any appreciable change in the state of conservancy resulting for Mr. Dalzell's new system? Were the forests better for it?

MR. CAMPBELL.—No; if they were, it was from increasing knowledge of the forests and forest work, not from the system.

DR. SCHLICH.—But if the officers are wholly under the Collectors, they ought to be always men of real knowledge; had you such in Bombay? how were the men appointed?

MR. CAMPBELL.—Well, about that time the Indian Navy was being abolished, and there were several officers out of employ to be provided for.—(*Laughter.*)

MR. B. POWELL.—One thing I have to urge: unless there is proper provision for the professional supervision of the work, and for the maintenance of proper conservancy and systematic working with a view to reproduction, any system of placing a Forest Officer wholly under the District Officer will end in nothing. This is the case in Madras. The Inspector of Forests is, I believe, much to his own

dissatisfaction, not allowed, or at any rate is not able, to do anything as he would wish. There is no kind of system of conservancy or order at all; there is no settlement of rights, and no working by regular rotations and year after year. In the local reports you will see repeated remarks to the effect that "it is impossible to take care of Railway fuel reserves unless fire and goats are kept out," &c.; but still no steps are apparently taken to remedy the evils, nor is any definite settlement of forest rights made. The officers, as far as I can make out, dislike their position thoroughly. The whole presidency, in a country—not like the Punjab, without a rainfall—but with a rainfall in most parts over 30 inches, that contains the Wynaad and the Anamalai Hills and all sorts of splendid places that *might* yield forest produce, actually gives a surplus of 30,000 rupees a year only! Preserve us from a system like this! I may take too unfavourable a view of results; but as regards Madras, it is the only conclusion one can have from reading the reports. I should be delighted to find I am wrong.—(*Laughter.*)

MR. B. RIBBENTROP.—The working of the forests called "district" or "unreserved" must be effected according to definite working plans, or as it may be preferable to call them "projects for treatment." These will be prepared by the controlling officer of the Forest Department in constant consultation with the District Officer. The general projects will prescribe that the forest is to be worked by blocks, in rotation, and that a certain percentage is to be open for grazing and yielding of products and the rest closed. At the beginning of every year, about the time the budgets go in, the precise yield of the open portions for the year is to be determined. These plans should not be interfered with.

COLONEL PLAYFAIR.—No reasonable District Officer would be so foolish as to wish to interfere.

MR. B. POWELL.—As long as the *treatment is defined*, I see no sort of danger; but if there was a District Officer who was unreasonable, he would want to change the plans and upset the conservancy arrangements on every occasion on which any body made an outcry. No plan of conservancy can be made without *some* restriction, and all restriction must touch some body; that some body will cry out, if he thinks he can get any one to listen to him. I want a definite settlement of rights and privileges, a general plan of work laid down, and then the local authorities must insist on

maintaining it, and the Government of India must enforce a clear and uniform policy, and look with decided disfavor on alterations and on all attempts to induce an unsettled state of mind among the people.

DR. SCHLICH.—If the Forest Officer is under the District Officer, need he be so placed in regard to "reserved forests," which are usually free of privileges and placed under strict management? In Sindh, all the forests are totally disconnected with the people and any requirements of villagers.

COLONEL PLAYFAIR.—That would transfer all forest management from the District to the Forest Officer.

DR. SCHLICH.—No; the special reserves would not be tracts with which the District Officer cared to interfere; and if he did, the Forest Controlling Officer would still be under the Commissioner according to my idea. The Executive Forest Officer would be under the District Officer as regards the "unreserved" forests, under his departmental Controlling Officer as regards "reserve," and when he had both sorts of forest under him, his relation to the district authority would be specially defined according to the nature of the individual case. The Forest Controlling Officer should be, in his turn, under the Commissioner or Chief Commissioner. At present the double control, first the Deputy Conservator and then the Conservator over him, is cumbrous, owing to the enormous area of the Conservator's charge. There ought to be only one set of Controlling Officers, each with a charge much smaller than the present Conservatorship, and the Controlling Officer would be under the Commissioner or Chief Commissioner, as the case might be. This has worked very well in Assam; here the Executive Forest Officers are not under the District Officer, but under the Forest Controlling Officer, and he again is under the Commissioner; the Commissioner only asks advice and inspection from the Conservator.

MR. MCKEE.—There would be some difficulty in cases when the Executive Forest Officer had charge of both reserved and unreserved forests.

DR. SCHLICH.—Still greater difficulty exists at present the few cases where such difficulty would remain would only be residuary; the great mass of the difficulty would be overcome.

MR. MCKEE.—If the Forest Controlling Officer had to make yearly a special plan for working in communication with District Officers, he would have to do it possibly with four or five different officers, and some might differ from him.

DR. SCHLICH.—Then they could refer to the Commissioner, who could take the advice of the Inspector-General, or rather a Board with the Inspector-General as President, which I would recommend.

MR. LEEDS.—There is another detail to be considered with reference to putting Forest Officers under District and Divisional Civil authorities: that forest charges extend over two or more Deputy Commissionerships, and even over several Commissionerships.

MR. B. POWELL.—But, of course, the present charges would be re-arranged. Every executive charge would be so arranged, and it easily might, as to put this difficulty out of the question. The executive charges being constituted, then the control charges would be arranged as groups of executive charges, so situated as to suit the Commissionerships. I am strongly opposed to the present double control; I would take executive charges as the unit, and have over these a single series of control charges called "Conservators," who would be under the Commissioners.

I would utilise the present staff, taking all the present Conservators and Deputy Conservators, as far as Rs. 700 per mensem, to be "Conservators," and all officers below to have "executive charges" under them in *professional matters* and under Commissioners generally.

DR. SCHLICH.—The control officer would stand in the same relation to the Commissioner as the Conservator at present does to the local Government. If the present Conservator is retained, he would be as the adviser and Secretary to Government.

MR. B. POWELL.—In many provinces, as in the Punjab, the Secretary to Government, Department Public Works, is also Chief Engineer,—that is, he inspects and advises Government. The present Conservators, if retained, should do the same.

CAPTAIN DOVETON.—But even then the Conservator could not always be with the local Government, or else he would not be able to acquire the local knowledge necessary to enable him to advise in forest questions.

MR. B. POWELL.—No; and therefore I say attach a "Forest Under-Secretary," a smart junior, if you like; but as to the double control first of a Deputy Conservator, and then of a Conservator, what good is it? Much better have *one* set of control charges of reasonable size under Commissioners. If the Commissioners wanted professional advice in disposing of references, or if the local Governments wanted the same in regard to questions referred by Commissioners, they could refer to the Inspector-General, whose office might then be made of some use.

DR. SCHLICH.—Conservators are doomed. We are getting into a complete change of organization; but it is necessary.

CAPTAIN LEWIN.—Admitting the antagonism of the departments, something must be done to put a stop to it, and a change of organization effecting this all-important object should not be objected to, merely because it is a change.

DR. SCHLICH.—The big Conservatorships are most objectionable. We have to decide questions that require local knowledge, and yet such is the enormous extent and the inaccessibility of some parts of the provinces,—take Bengal for instance,—that a Conservator will take years before he can become familiar with his charge. Then there must be a good staff finally to decide professional questions, and that might be done by associating the present Inspector-General with two of the present Conservators—say the most senior and experienced, and letting them decide departmental questions.

MR. B. POWELL.—That is just my view. In my opinion the Inspector-General's office as at present constituted is worse than useless; it is a charge on the revenues to no purpose. The Inspector-General merely acts with rather less power than an Under-Secretary to Government, though he is paid double. I speak from experience when I say that any good trained assistant after three or four years' work in India, and paid say Rs. 700 a month, could do all the work that the Inspector-General has to do; this is just the class of man that is taken, and with marked success, from the Civil and Uncovenanted services to do similar work in the Secretariat. But then there is absolutely no getting a decision on any professional question. Every Conservator decides as he pleases, more or less interfered with by non-professional orders—*e. g.*, the Conservator of province X determines

to treat his Sâl forests in a certain way and sends up his proposal; probably the local Government sanctions it. How is it possible that the Secretary to Government should be in a position to advise his chief on such a point? Then either there is a virtual decision by one Conservator confirmed *pro formâ* by the local Government. No such general projects ever ought to be settled by one man. Nor are they ever so settled in any country in Europe. Also, a proposition of the utmost importance may be negatived; whereas it would hardly be so, if the Conservator's professional opinion instructed up by a competent board. If the Inspector-General were of any use, he should be associated with two senior and thoroughly good officers, and these would advise local Governments and actually decide on purely professional questions, such as sanctioning working plans or "treatment-projects," plantations, &c., &c.

DR. SCHLICH AND OTHERS.—Certainly; and the division of labor among the three members, a matter of detail, could be easily arranged.

MR. B. POWELL.—Yes, and it would enable inspections to be made without interfering with the correspondence and office work in the Inspector-General's Department.

MR. RIBBENTROP.—We are all agreed about this;—to return to the relation of the District and Forest Officers.

DR. SCHLICH.—In the Western Dooars all the area is under the District Officer, except as regards four kinds of trees which are under the Forest Officer. What is the use of this? Much better that in such cases the whole thing should be under the District Officer. But it is essential that, as a safeguard, the District Officer, the Controlling Forest Officer, and the Executive Forest Officer, should in consultation prepare a general and simple project of working the forests, and that when once this is approved by the local Government (and by the Forest Board as regards its professional details), the officers concerned *should be bound* to adhere to it, and be responsible for so doing, unless it is deliberately revised in consultation in the same way.

MR. B. POWELL.—We have two alternatives,—either to place, as Dr. Schlich first suggested, the Executive Forest Officer under the District Officer as regards "unreserved forest and not as regards reserved," or to place him under the District Officer as regards *all* forests, but leaving him to

receive orders on purely professional questions from the Controlling Forest Officer. I confess I prefer the latter: it is the best way of settling the necessary difficulty of serving two masters.

MR. DRYSDALE.—If you have the former, you must have a complete separation of reserved and unreserved forests, and separate Forest Officers for each.

MR. B. POWELL.—There is another point: I want all the good-will and power of the district brought to bear in aid of the work of forest conservancy. If you say "here is a reserved tract, now, the Deputy Commissioner has nothing to do with that;" the Deputy Commissioner will naturally feel that it is no business of his, and will cease to take any interest in it. The Bombay system spoken of by MR. CAMPBELL was all right as *far as it went, but* it lacked the essential safeguard; *viz.*, the determination of a plan of treatment after an accurate settlement of rights and privileges based on a thorough enquiry into the state of forests. As long as that was not done, the Collector did not know what course ought to be pursued, and very probably his forest assistant did not either; if the latter happened to know really his business and was trained to it, he was in a very awkward and isolated position; he felt it a difficult thing to go to the Collector and propose a system of organization. Possibly the Collector, not knowing anything about the subject, and not very much impressed with the necessity of what the professional man well knew was indispensable, would turn rather a cold and indifferent ear to it, readily take refuge in excuses about interfering with the people, &c., and then the assistant with no one to back him up—no responsible forest authority of weight—would go away in a hopeless frame of mind, and content himself with just the usual humdrum, by which conservancy of the forests and the acquisition of knowledge requisite to their treatment is not advanced a bit.

It is *only* after a proper determination of how all forests are to be treated, whether "reserved" or "unreserved," and providing for non-interference with that treatment, that the subordination of the executive forest to the civil but non-professional administration can be carried out with safety.

DR. SCHLICH.—On the whole I agree with this latter view; it is perhaps the best way of settling the difficulty,

then we shall have a relation like that between the Controlling and Executive Forest Officer, if the latter is subordinate to the District Officer. I cannot do better than remind you of the relation existing between the District Executive Engineer and Superintending Engineer now existing in Bengal. There the Executive Engineer is subordinate to the District Officer, and the Superintending Engineer is official inspector of all works entrusted to the Executive Engineer, and he is professional adviser to the Commissioner of the Division. The initiation of all works rests with the head of the District or the Superintending Engineer. All works, you will observe, are carried on under the general direction of the Civil Officer, and under the professional supervision of the Superintending and Chief Engineer. In the case of the Forest Department, I should advocate that the Executive Forest Officer would hold a position similar to that of the Executive Engineer, and the Conservator similar to that of the Superintending Engineer; but it must be understood that a plan of operations is laid down for each year by the Conservator, District Officer, and Executive Forest Officer, in consultation with each other, which has to be adhered to during the year, unless any proposed alteration is approved of by both the District Officer and Conservator. If they do not agree, the decision will be given, according to circumstances, by the Commissioner of the Division or the Forest Board.

MR. REYNOLDS.—This is something like what is done in Hazára. The forests recently settled are divided into "reserved" and "unreserved;" but the terms are chiefly concerned with describing the state of the forests as regards forest rights and privileges than as describing any difference of administration. All forests are under the District Officer, guided by the Controlling Forest Officer in professional matters.

MR. B. POWELL.—It will work no better than Madras or Bombay, unless the treatment of the forest is prescribed and the principles of the settlement held to; there must be an immediate action in settling plans of yield and treatment.

MR. DRYSDALE.—If you make all the controlling charges smaller, will you not abolish the good appointments?

MR. B. POWELL.—Certainly not; no kind of alteration for the worse would be made; no salary or prospect of

promotion would be reduced, only the individual charges would really become much more satisfactory, at least to a good man; for every one who is worth his salt, likes to have responsibility and to show that he can make something out of his division,—I mean make first-rate forests,—if he is allowed fair scope and is intelligently directed by an authority in whom he has confidence.

CAPTAIN LEWIN.—Let us now draw up a resolution on the subject. Better appoint a committee to consider the wording, in the sense of what we are agreed on, and bring it up on Monday.

DR. SCHLICH.—Let there be two District and two Forest Officers, and the Inspector-General.

(Agreed *nem. con.)*

The resolution was presented as follows by—

Colonel Playfair,
Captain Lewin,
Dr. Schlich,
Mr. J. Campbell, C. S., and
Mr. Baden Powell, C. S.

RESOLUTION.

Experience has shown that the present organization of the superior grades in the forest service is deficient in several respects.

I.—In the first place, it provides for a twofold system of control of Executive Officers, first by officers called Deputy Conservators and then by Conservators. That this twofold control is unnecessary, and often leads to delay and inconvenience; and that under any circumstances the Conservator's charge is so large that, although almost every question he is called on to decide is dependent on thorough local knowledge, it is impossible for him to acquire that knowledge, except gradually, as it takes him years to become acquainted with the whole of the forest area under him.

II.—In the second place, it does not provide for placing the officers of the forest service in a satisfactory or definite relation to those of the civil administration.

III.—Thirdly, that the final professional decision on forest matters, often of the greatest importance, rests either with one single Forest Officer or with an authority entirely unprofessional, and this appears to the Conference to be a more than questionable policy.

To meet these three heads of deficiency, the Conference would propose to Government that a change in the present organization should be made in the sense of the following proposals :—

I.—That the present extensive Conservatorships should be reduced to such charges of suitable size, (corresponding, for instance, to one or even two Civil Commissionerships,) that the Conservator may be able thoroughly to inspect and control each of the executive charges which would be immediately under him.

This could be effected by utilizing the present senior staff of all grades down to Rs. 700 per mensem as Conservators, leaving all the rest as Executive Officers.

Otherwise, as an alternative plan, that the whole of the provinces should be divided out into controlling charges, the officers in charge of which would have controlling and inspecting duties only, as the immediate superiors of the Executive staff, and that then the Conservators, supervising generally the whole of the controlling charges, should do so chiefly as the advisers of Government, they being in fact a sort of Secretary and their office constituted for forest works just as the office of Chief Engineer and Secretary to Government in the Department Public Works is in many provinces.

But the former proposal seems preferable, specially with reference to what has presently to be proposed on the third head.

II.—That the Executive Forest Officers should be, both with regard to "reserved" or departmental, and "unreserved" or district forests, alike, entirely under the orders of the Civil District Officer in all non-professional matters; but that in all purely professional matters connected with the utilization, management, and reproduction of the forests, he should be under the orders of the Forest Controlling Officer. That the forests being managed according to simple general projects for treatment, drawn up in consultation with the

District Officers and afterwards professionally approved,* there would be no practical difficulty in this; the Executive Forest Officer would be the Assistant to the District Civil Officer, but receiving technical direction from the Forest Controlling Officer. That the Controlling Forest Officer should in his turn be under the orders of the Commissioner of the Division, or the Chief Commissioner of the smaller provinces, as Government may decide.

If a second series of officers (Conservators) are to be retained over the controlling forest officers again, the Commissioners, &c., would communicate with them for advice and information, as they do to the Secretaries of Government in the Department Public Works or other Departments.

If the Conservators as a second controlling agency are not retained, the Commissioners would refer to Government for orders, or to the Inspector-General's Office for professional advice, as might be arranged.

III.—That the Inspector-General's Office should be reconstituted, so as to make it really useful as an office for the final decision of technical and professional points connected with working plains, treatment of forests, management, utilization, exploitation, reproduction, &c., &c.; &c. That for this purpose two officers (Deputy Inspectors-General) should be associated with the present Inspector-General, and these three officers would form a Board for the decision of such questions, the Inspector-General being president, and the three officers dividing out the work of inspection and correspondence, according to heads of work, or otherwise, as may be found convenient.

That the Board should have the final direction on the *professional* subjects already indicated, and the Forest Controlling Officers (or Conservators if they are retained in the present form) should correspond direct with the Board on such matters, and be bound to carry out the directions received. The orders of the Board should be liable to be over-ruled only by resolution of the Government of India.

MR. B. POWELL.—With reference to this subject, I should like to add a word with which I am sure no one present will differ. It is, that it is important for local Govern-

* This procedure will be found described more in detail in the foregoing discussion, and also in the subsequent papers on settlement of rights and systems of exploitation.—ED.

ments to exercise a wise discretion in posting Civil Officers to districts where there is a great deal of forest work. Some officers will take a real interest in such work, some will not. I shall not be misunderstood by any District Officer here, when I say that I have met with one or two, and one or two only in the Punjab, and have heard of others, to whom the subject of forests was always sure to be misunderstood; they were perfectly unreasonable on the subject. Whether this proceeded from a disbelief in the exhaustibility of forest products, or in an intense dislike to having anybody in the district besides themselves, I cannot say, but it is a fact. Now, if such people were posted to forest districts, there is no hope for *any* scheme. Let me take such an instance as the Melghât (Berar). While an officer like Captain Mackenzie is there, the forest work goes smoothly; but should such a calamity happen as his removal, and some officer were to come in his place who disliked forests, the whole place would be in confusion in six months.

MR. REYNOLDS.—Fires, our greatest enemy, cannot be suppressed without such assistance.

MR. B. POWELL.—Yes; in one of the districts with which I am acquainted, I recollect that fires were almost unknown owing to the unseasonable action of the Magistrate. He went away, and soon after there came an officer who has always opposed forest work in the most violent way; an extensive fire broke out destroying many square miles. Had it been known that the District Officer was anxious about the forests, the thing would never have happened; but the people saw that no convictions were ever obtained for forest offences; that the forest officials were always in the wrong somehow, and of course *they* had nothing to fear, so they burnt the forest. It is just to add that the people *were* punished, but that is all, and you will see that they will do it again.

SUBJECT III.

FOREST REVENUE AND THE FINANCIAL POSITION OF THE FOREST DEPARTMENT.

MR. RIBBENTROP opened the subject with the following paper :—

The recent complaint of the Financial Department, that the Forest Department does not show an increasing revenue, is a question of vital importance for our department.

I am treating the subject quite from the Punjabi point of view, but the general principles on which my argument are based hold good for any other province or country.

As forest, I define all larger areas on which trees grow spontaneously, and all larger plantations on which trees are cultivated.

All revenue derived from such areas I hold to be forest revenue, whether derived from wood or from miscellaneous forest produce; such as, grass, grazing, digging kunkur, or breaking stones, &c.

In the Punjab, the whole revenue of the forest area has, up to date, not been credited as forest revenue, and only those tracts have been regarded as forests which have been actually transferred to the Forest Department.

Thus we find a direct income obtained for the same material, and derived from the same sources belonging to the same proprietor, is credited under different headings—as "Forest Revenue," where the forests are administrated by our department, and as "Miscellaneous Land Revenue," where the last lands are under the district authorities. This is, however, not the case in all districts; for instance, in Rawulpindi and Hazara the Government forests have been transferred *in toto*.

The income thus credited to Miscellaneous Land Revenue amounts to upwards of Rs. 2,00,000. To credit this amount to Forests, would, in the first instance, not swell the total revenue of the province, but I am certain it would facilitate general conservancy, promote the settlement of rights, and would tend to increase the total revenue of the whole forest area.

I would rather see the whole forest area in our plains and lower hills under the district authorities till a complete settlement of all questions of rights has been effected, leaving only utilization and reproduction in the hands of the forest officers, than to have the area and revenue divided.

Government obtains another direct income from forest lands, which is neither credited to Forest nor to any other revenue,—I mean the free grass supply for cavalry regiments, batteries of artillery, and the commissariat.

The rukhs made over to them are mostly in places which would command a good market for all forest produce, fuel, and miscellaneous.

The area of these rukhs throughout the Punjab amounts to 26,650 acres, with an estimated income of Rs. 13,000, part of which the military authorities receive as a direct income in money derived from grazing passes.

The Montgomery police, too, holds a free grant of 5,122 acres of land close to the station, worth at least Rs. 640 per annum.

Formerly, the Public Works and Civil Departments for district work were, in some districts, allowed to obtain timber at reduced rates, or free, thus appropriating part of the forest revenue. This, however, has ceased, I am happy to say, and His Honor observed, on a reference made by me, that whatever exceptions there may have been hitherto to the practice, there is no doubt that timber purchased from the Forest Department by officers in other departments of Government should be paid for at the ordinary rates, and not at the rates fixed for privileged persons, such as zemindars.

Some of the bridge of boats make, as far as I know at present, the only exceptions, and a few small rukhs have been granted free to them for the supply of grass and "munj" (sacharum) for ropes.

MR. B. POWELL.—This opens up the subject of fixing arbitrary prices for forest produce, which has a most injurious effect. In Sikhim the prices are fixed by *rule*, without any reference to demand or supply, scarcity or plenty!

MR. J. McL. CAMPBELL.—In Bombay, revenue has often been reduced by purely conservancy measures; for instance, formerly all wood used to be sold standing, and the purchaser used to choose his trees. Here there was no supervision and no conservancy, consequently the whole revenue from the trees was credited, and was not reduced by any *per contra* charge of establishments. But this revenue was attained at a pure and wholesale waste of material and deterioration of the forest. Now we have insisted on supervision and on cutting ourselves, hence the price of the timber is reduced by the conservancy charges—but no financial authority ought to complain of this—or they are directly encouraging the waste of forests in order to produce a large present outturn. But the arbitrary fixing of prices has a most evil effect. In Sindh the profit made on wood was, in 1870, decreased by a reduction in price under the orders of Government, in favor of the steamers, from Rs. 18-8 to Rs. 16 per hundred maunds. The department always protested against the reduction.

MR. B. POWELL.—And this reduction is based on no grounds whatever, but to make the steamer service appear to pay. That is what I complain of. The forest revenue has always to give way to every other consideration, and then we are told we do not make revenue.

MR. RIBBENTROP.—This subject must be clearly brought out, for the arbitrary rule about prices in Sindh has a direct tendency to injure the sales on the other side of the river in the Punjab, and to seriously diminish the revenue. The Sindh royalty is merely nominal, and in the immediate vicinity the Punjab charges a fairer rate of from Rs. 5 to Rs. 7-8 per hundred maunds. I should like to hear an explanation of the reason of this.

MR. J. McL. CAMPBELL.—The Sindh Railway has its terminus at the port of Kurrachee, where coal is of course much cheaper than in the Punjab. To supply this railway with fuel, we must be content with prices sufficiently low to make it more economical for the railway to use wood than to use coal, and therefore we must be content with much smaller profit from railway fuel than the Forest Department in the Punjab gets on its firewood. Looking to the price of coal, Rs. 16 per hundred maunds was the highest price which, when rates were last fixed, could be asked for. The rate fixed for Kotree (which is our only depôt for railway fuel, and our largest depôt for steamer fuel) was extended to the whole of Sindh, on the ground that it cost us no more to supply fuel in Upper than in Lower Sindh. Rates for the whole of Sindh now stand at Rs. 16 per hundred maunds delivered at the wood stations, which, deducting all expenses, leaves as royalty Rs. 2 per hundred maunds. This royalty Government considered sufficient. To this conclusion they were led partly by the fact, that Mr. Fenner was at that time selling firewood by auction, in Kotree and Hydrabad,* for about Rs. 15-12 per hundred maunds. Government considered this to be approximately the market value of fuel. But though this principle, that auction sales indicate the market value, may generally be true, yet there are in Sindh special circumstances which, in the case of steam fuel, make it an unsafe guide. The general public have in Sindh the free run of the waste lands, which would in some other parts of India be district forest. It is only in the cities of Hydrabad and Kurrachee, and there only to a moderate extent, that house-holders have to look to the Forest Department for firewood. The prices, therefore, which they are willing to pay, are lower than what might be asked from large public companies which have only the Government forests to look to. I should mention that, though Mr. Fenner

* Which is close to Kotree.

got only Rs. 15-12 for his firewood, upwards of Rs. 19½ have been realized in sales held by Dr. Schlich and myself. Dr. Schlich, in 1872, attempted to raise the rates for railway fuel, but the attempt was given up on the railway showing that with coal at its then price there was no economy in using fuel at Rs. 16 per hundred maunds.

Shortly after this discussion the price of coal rose 50 per cent., and has never come down again; but before there was time to take advantage of this rise, Dr. Schlich was called away from Sindh, and the question of rates was not again raised till I went to Sindh a few months ago. I have now proposed to raise the rates on the grounds that coal is dearer, and that auction prices are higher than when rates are last fixed. I have, however, proposed a uniform rate for Sindh. But I should be most happy to obtain still better rates by assimilating the prices in Upper Sindh to those obtained in the Punjab, and this, taking an imperial or general and not a provincial or local view of the question, is what ought, I now think, to be done. The proper course to be adopted is, I think, as follows:—

To ascertain on the one hand the highest rates for wood at Kotree, at which the railway will burn that fuel rather than coal, and on the other hand to ascertain the average royalty paid by the Indus Flotilla in the Punjab district nearest Sindh, then to fix rates for the intermediate stations on a sliding scale between these extremes. Thus, say, Rs. 20 is the highest rate at Kotree at which we can under-sell coal; this is equal to a royalty of Rs. 6, the average cost of supplying 100 maunds, being Rs. 14. Say, again, that the average royalty on the Punjab border district is Rs. 12, then Rs. 6 and Rs. 12 will be the extremes of the sliding scale of royalties. Rates might then be fixed thus,—from Kotree (to Sehwan) for the first hundred miles up stream Rs. 20, for the next hundred miles* Rs. 23, and for third† hundred miles Rs. 25. I put the highest rate at one rupee, below the rate for the last Punjab dâk, in consideration of the 20 miles of river which there are between our last dâk and the first one in the Punjab. As the sale of fuel to steamers and the railways bring in more than half my gross revenue, the question raised by Mr. Ribbentrop is of vital importance to me, and I shall be glad to hear the opinion of the conference upon it.

* Sehwan to Sukkur.
† Sukkur to frontier.

DR. SCHLICH.—The price was fixed for all Sindh, and no change made when the demand was increased by the railway burning wood.

MR. CAMPBELL.—And the price is fixed by the minimum rate at Kurrachee, whether the depôt is one to which fuel is brought cheaply or not.

DR. SCHLICH.—The firewood is stacked at particular places, solely for the convenience of the different consumers; yet, if stacks are washed away from those places by the river, the department bears all the loss.

MR. MCL. CAMPBELL.—The Indus State Railway, too, gets wood from revenue waste lands for nothing; hence, of course, they never buy wood at all from the forests. No fees are charged them. And this is not all, for we not only lose the entire revenue, but as the railway have to pay nothing for the original value of material, they can afford to pay for cutting and stacking it higher than we can when selling rates are arbitrarily fixed. We have hitherto paid for cutting and stacking Rs. 5 per hundred maunds—the railway, I believe, pay Rs. 7 or thereabouts, and to keep our gangs of cutters together, and prevent them leaving, we have had to raise our rates one rupee in some districts, thus seriously affecting our small margin of profit.

MR. B. POWELL.—This ought not to be allowed.

MR. DRYSDALE.—There is another closely connected point,—the effect produced on prices by action taken in different districts or provinces, albeit by officers of the same Government who ought not to work so as to injure each other. For instance, the rates of seignorage charged at toll-houses in the Central Provinces on forest produce are lower than those in Berar. Many of the Berar people, therefore, go to Central Provinces and import their produce from thence, rather than purchase it from the Berar forests.

MR. WILD.—At Hassan Abdal, villagers who have lands producing fuel granted them, on the express and clear rule that they are to use the fuel for their own domestic consumption and not for sale, were allowed, in direct defiance of the rules, to sell firewood to the late Camp of Exercise; being able to do it cheaper than Government could, because it was nearer, and because they did not look to the future,

but recklessly sold for what the moment would bring in, they caused a large amount of Government fuel to lie on the ground unsold and going to waste.

MR. B. POWELL.—The people diminished their own domestic supply, in fact for the sake of a momentary profit, which was illicit, and thus injured the Government revenue.

MR. B. BROWNE.—Another instance. In the Jhung District, the district officer reduced suddenly the grazing rate (tirni) far below what it was in the neighbouring district of Gujranwalla; this caused people to send their cattle to the former district, and the Government lessee of Gujranwalla, who had bought the lease, of course, on the understanding of the usual rates, lost considerably.

MR. RIBBENTROP.—But to resume our paper:—

Local cesses, though apparently levied on the contracts given in the forests for grazing, quarrying, or digging "kunkur" (lime concrete), affect the direct revenue of the forests to a considerable amount, and are a *bonâ fide tax* on the forest income.

MR. B. BROWNE.—In 1872, the grazing leases of the Gujranwalla district jungles were sold for Rs. 42,000; no intimation was given to the lessee that he would be obliged to pay the local cess, as the Financial Commissioner's circular on the subject had not then reached the Forest Office. However, the civil revenue officers demanded the cesses for *this department*, and Rs. 3,730 were paid directly to swell the local revenue at the expense of the imperial.

MR. A. E. WILD.—In 1872 or 1873, I forget which, at the annual sale of the leases for the Gujrat district, I accidentally sold 3 or 4 leases without first intimating to the bidders that they would be required to pay such local cesses as were prevalent in the district (13 per cent.). Having gone so far, I recollected the omission. The contractors, you will observe, had only to deduct the bare amount of the cess, but they *declined*, and I had to put up the leases again, and could not induce any one to bid—the amount of the first bid less the 13 per cent. So that it is clear that the fear of these cesses not only diminishes the revenue by the actual amount of the fixed cess, but by a further amount, which represents the dislike of lessees to pay for fear of extortion, uncertainty, &c.

MR. B. POWELL.—We have in many cases, I believe, to pay the *cess ourselves*, so as to avoid this loss. This is, as

Mr. Ribbentrop says, a *bonâ fide tax* on income of the forests. If it is a definite desire of the Imperal Government to let this be so, I have no objection; only don't say we make no revenue, put it in the accounts—'to so much deduction from grazing revenues to local funds.'—The attention of Government should be invited to this subject.

MR. RIBBENTROP resumed:—

The unsettled state of forest rights is another cause which influences the direct forest revenue by the effect their exercise produces on the market. We have but a small local market in our province, as the inhabitants of most of our agriculture districts obtain wood for building, firewood for their own use, and thorny brushwood for hedges, either free of charge or at nominal rates; and our only source of direct revenue from timber and firewood consists in the supply of large towns and public works, and is therefore subject to constant fluctuations. The trade is brisk when large public works are begun, but soon the market gets overstocked by the careless utilization of the Kashmír forests and of the private resources in our own province, and the consequence is a waste of material by deterioration.

The indirect revenue from the Punjab forests is but rarely recognized at its whole value, and it is only by the most careful statistics collected from each district that we would be able to arrive at an approximation to it.

To give you an idea, however, of the extent of these rights, allow me to enumerate more important ones, district by district.

In the Hazara district the forests are divided into reserved and unreserved forests, the latter being by far the larger portions of the whole forest area.

In these unreserved tracts the zemindars have the right to timber and firewood for their own uses, domestic and agricultural, and the right of free grazing. The only right Government has reserved, is the right of cultivation and utilization if a market can be found, as well as that of prohibiting zemindars to trade in timber or fuel.

Half the income of the reserved forests is payable to the zemindars, Government bearing, however, the whole expenditure of the supervision.

MR. B. POWELL.—The Hazara forests are really communal forests managed by Government, Government taking 50 per cent. of the gross revenue to pay supposed costs of management. I think that the Hazara budgets should be very carefully scrutinized, and I would refuse to spend more on them than the 50 per cent., unless Government realized the position and distinctly chose to do so.

The Rawulpindi forests, too, are to be separated into unreserved and reserved forests, the former amounting to 70 per cent., the latter to 30 per cent. of the present forest area. The rights in these unreserved forests are to be similar to those in the Hazara district, and if no suitable provision can be made in these unreserved forests, fuel and timber for

agriculture purposes have to be supplied to the zemindars from the reserved forests.

Two annas in every rupee, income of unreserved forests, has to be paid to the zemindars, though again Government has to pay all the charges of supervision, &c.

MR. B. POWELL.—The two annas is to be formed into a fund, to be paid out *only* as rewards to people who aid conservancy, keep down fires, &c. &c.

MR. RIBBENTROP resumed :—

No fees whatever are levied on the grazing, and the use of firewood, &c., for agriculture purposes, in the Khwarra jungle in the Kohat District.

Wood for agriculture implements and brushwood for fencing has to be supplied free from charges in the Shahpúr District to all those villages which have not the necessary material within their own Shamilat and common lands.

In the Lahore District all cultivators are exempted from half the fee for grazing buffaloes and cows.

In the Montgomery, Múltan, Mozuffergurh, and Jhang Districts, even in those forests transferred as reserved forests to the Forest Department, permission has been granted by Government letters, Nos. 1, 101, 108, of 14th January 1873, for the consumption of old wood, for wood to make agricultural implements, for timber required for wells, and for cattle sheds. The lopping of branches for cattle and goats' food is another assumed right in these districts.

The rights in the Derajat Districts have not as yet been settled, but the Deputy Commissioner states that there are many rights in Dera Ghazie Khan which he gives as the reason of the delay in the transfer to this Department, so they are apparently not inconsiderable.

In the Gúrdaspúr District free grazing is allowed to all zemindars, as well as dry wood for burning, and timber for agricultural purposes. The contract for the grazing of sheep and goats belonging to the Chamba Gaddís, has year by year been given to the same person for Rs. 650, and I believe is claimed as a right for this sum.

The Hushiarpur District is the only district in which the forest rights have been properly settled, and have been put on a sound basis. Out of 34,710 acres pertaining to 44 villages, Government have reserved 7,799 acres as Government forests; but even within part of these forests 32 villages have free grazing right, and can obtain bamboos at cost price for their own use.

The rights in the Kangra District are extensive, and will necessitate great sacrifices of area before they are put on the same footing as those in the Hushiarpúr District. In the Kullú Valley, too, the rights are such that we have no local sale of produce or any income from grazing leases.

These statements will prove, even to those of you who are not acquainted with the Punjab, that the greater share of the forest revenue is consumed by private interest, and helps to enrich individuals and communities of the province.

MR. B. POWELL.—The same thing applies to other places. Captain Wood writes from Oudh:—

We are *obliged* to give grazing to thousands of cattle at a rate *per annum* which would only feed a bullock in the civilized country *for a day*. We used to charge two annas a bullock per annum, we charge three annas now. The owners feed up a young calf, say two years, and sell it from 10 to 20 rupees. Paid to the Forest Department six annas or less.

We have to give grazing and consequently allow fires. We get three annas per head of the cattle and lose rupees by non-reproduction and unsound timber. Moreover, we have a ruined estate made over to our charge, and they want us to give money, money, when we want money to put things straight and improve the property. If we are putting our money out at better interest than what Government can borrow it, are we not doing good? With the limited conservancy that we are allowed, I will vouch that the Oudh forest are paying. And if we could get more supervision, we could make more direct revenue, and also increase the value of our capital.

MR. RIBBENTROP resumed:—

Besides these constant strains on our forest resources, free grants of land to deserving members of the native community must diminish the forest revenue. In the present instance, 2,500 acres are being granted to Mahomed Sooltan, a man most deserving of this largess, but I think that the value of this land should be credited to forest revenue, with a view of passing through some definite account, or the value of such a grant is financially lost sight of.

DR. SCHLICH.—I do not think the value of land transferred from the forest to other purposes could be credited to the Forest Department, because we have in the first instance no stock account, and, besides the proceeding had better be as at present, that the land is handed over to the civil authorities, and leave them to consider the question of the value of the grant they make; otherwise, if we take credit for the value of land not required for forest purposes, we should have to pay for all land taken up by us for forest purposes.

MR. A. E. WILD.—I do not see in what way the value of land transferred from the Forest Department for free grant, or otherwise, could be credited in the forest accounts. It could not appear in the cash books, since no money is received. Had we only a stock account, showing the value of all forest lands and the wood thereon, it might appear as an expenditure in that account; but I do not see where it could be shown as a receipt unless, perhaps, it be added to the net proceeds of the year.

MR. B. POWELL.—If the land taken were *bonâ fide* forest, which had a value and a use as forest, it would be desirable that some account should be taken of the quantity of forest land given up. If it is not so, then it merely goes on the same basis as a waste land grant; and I do not know what accounts are kept in the Revenue Department to keep Government informed of its free grants and of the diminution of its lands in consequence. In practice, of course, we have no stock account, and therefore cannot credit or debit such transactions in our books.

This is the present state of the forest revenue in the Punjab, and the large income of the later years, which at the same time necessitated a considerable expenditure, I consider to be to a great extent of an artificial growth, and I have no doubt the income will decrease again as soon as our State Railways are finished.

It will be one of the chief duties of the Conservator of this Province to cover his retreat as skilfully as possible and to decrease expenditure, wherever he is not certain that the income will justify the outlay, or if he has not unfailing proofs, that the outlay is immediately required to ensure future benefits to the country.

The first steps to raise the forest revenue have been already pointed out in the foregoing, but granted it to be impolitic to charge all forest revenue as such, or to deprive Indian cavalry of grants which are not shown as either expenditure or income in any revenue accounts, and only in regimental accounts when money has been received, admitted that miscellaneous forest revenue in the Punjab ought to be taxed, it requires all the more our energy to make the most of our crippled resources in a market where we not only meet material from private forests, but material belonging to the same Government brought for sale by another agent.

The question how, under these circumstances, to raise the direct revenue has been discussed in the Government of India's letter No. 8744, and the common sense and practical principles laid down therein should never be lost sight of.

The market in the Punjab is, for reasons explained, a limited one, but the study even of the statistics of the requirements has been inconsiderable; still it has opened our eyes to some important facts.

We cannot, obliged as we are to keep an expensive establishment, cope with the prices of deodar supplied by contractors, and can therefore obtain a supremacy in the market only by the delivery of a better material.

At present the demand of the Public Works Department is chiefly for deodar, and this is, though far from perfect, undoubtedly the best wood we have at our disposal. However, the life of deodar Railway sleepers is but rarely more than 10 years, and on the Northern State Railway I have seen sleepers which begin already to deteriorate, though not laid more than 3 years ago; whereas impregnated pine sleepers on the East Indian and other Railways in the country have been taken up after 13 years, and showed no sign of deterioration.

The *Pinus longifolia*, of which tree we possess large forests, has a greater carrying power than the deodar, and I am convinced would answer all purposes if properly impregnated.

At Changa Manga, again, we have a large sissū forest growing up, and I see no reason why an impregnated sissū sleeper should not answer every purpose as well and better than impregnated beech wood at home.

However sissū wood may be too close grained for impregnation.

It seems obvious that impregnation would insure as the timber market, at least that of Public Works; if not all at once, still as soon as the already exhausted deodar supply ceases.

Accumulation of impregnated material is not to be feared, as the timber would deteriorate but slowly, and the depôts would never form breeding places of insects.

The erection of depôts both for fuel and scantling near all large towns, cantonments, and in other places where a local market is obtainable, is of the greatest importance, not only for forest revenue but also for direct conservancy.

I quite agree with the views put forward in Mr. Reynold's memorandum on the working of the Hazara forests read at the last conference.

To show the profits we can derive from these depôts, I give you the following statistical figures for Lahore and Amritsur.

Lahore uses 6,000 cubic feet of second class deodar timber per mensem; at a rate of 10 annas, and after deducting the price of wood in the Shadrah depôt, sawing and carriage to the city depôt, a profit of Rs. 800 per mensem would be left.

The cities of Lahore and Amritsur alone consume an average of 100,000 maunds of fuel per mensem, representing a value of Rs. 33,000. Hardly any of this has, up to date, been supplied by the Forest Department, though we could deliver all of it in the depôts from the rukhs in the Lahore and Montgomery Districts, gaining a clear monthly profit of Rs. 5,000. Due weight has been given to the question of reproduction.

Small items even like railway keys tend to swell the revenue. I have been informed that several lacs of these are annually used by the railways in this province at Rs. 7 a hundred for those made out of sissū, and Rs. 4-8 if cut out of kikar wood. We ought to get the supply of these into our hands, and in 8 or 9 years, when the Changa Manga forest begins to yield, no contractor will be able to cope with us.

A tender ought to be submitted by our department for all timber and fuel supply to all railways and Public Works Department works, wherever we have calculated it possible to make a profit without interfering with the general conservancy.

I believe it is considered "*infra dig*," but we ought to enter the market like other merchants and fuel contractors; and as long as this is not the case, we shall be constantly in want of Government help and make ourselves unnecessarily dependent.

The numerous files in the Conservator's office at Lahore, regarding the supply of State Railways, show that forced transactions cause unnecessary amount of work and ill-feeling, and have in this instance certainly not proved to be profitable for the Forest Department.

MR. WILD.—The supposition, that the whole of the fuel consumption of the cities of Lahore and Amritsur would be supplied by the Forest Department, and the anticipation of the revenue stated, assumes that the present traders would be put down; whereas I am inclined to believe that it would take some time before the present traders were extinguished. In the end, however, Government would no doubt secure a monopoly;—but would such a course be wise? Is it not rather the duty of the State to supply only such a quantity as the forests are known to be able to yield without abusive felling (I much doubt if they are capable of yielding the supply named for any length of time) and to foster free trade?

MR. B. RIBBENTROP.—I expected this objection. The present traders are either only middle men between Government and the Lahore public, or have obtained, till now, their supplies from zemindars; and as land becomes more valuable in the vicinity of the capital, private rukhs and common lands are given up to cultivation, and the supply diminishes annually.

I propose to supply the towns chiefly from the more distant and very extensive rukhs in the Montgomery District, and as far as I can ascertain, being however without accurate statistics, I am convinced that Government will be able to supply the quantity without abusive cutting of these rukhs.

It would lead me to be far to enter into a discussion regarding free trade in forest material, but I think that Government cannot keep too strict a control over a trade which may enrich an individual, but nearly always at an inadequate cost to the public at large.

The settlement of the above enumerated and other minor rights will almost immediately raise the forest income, and be one of the most important means to keep it up. These rights are not only incompatible with rational conservancy, but in spite of all forest accounts must endanger the very existence of forests. We have not to look far for examples in our province; we have only to open the Rawulpindi settlement report. The rights are apparently the same now as in 1865, but the right-holders have increased; they keep a larger number of cattle, have more land under cultivation, their wants have grown everywhere, and the burden on the forest is not the same.

The Kacchi forest on the Indus, again, once of the greatest value, has dwindled down to a few unimportant tracts dispersed over the island by the increase of population and cultivation. It is high time to cry out, "Hitherto shalt thou go, and no further."

To divide the forests simply into reserved forest and unreserved forests, and to state that the zemindars have such and such rights in the unreserved forests, is totally insufficient.

What zemindars? and to what extent? It does certainly not define the right, only to state that the unreserved forests are burdened with certain rights; we must insist on a definite and ultimate division,—as village A is entitled per annum to firewood for 100 houses at the rate of 5 maunds, has grazing rights for 500 cows, and a fixed quantity of building wood per annum, which cannot be increased, but may accumulate.

Only in this way we can lay a satisfactory basis for a future expropriation of all rights, which is sooner or later required in the ordinary run of things.

The public opinion is most natural against sudden measures, and I do not recommend these; I only wish to see the "*status quo*" fixed, the more so as it seems to become more and more the fashion to interpret the *in dubio contra fiscum* as "*semper contra fiscum,*" notwithstanding the constant preaching that the fiscus is nothing but the total of the tax-payers.

As said before, there must be some day a total expropriation of forest rights, and it is our duty to work slowly and steadily up to it, after we have laid our foundation for it as quickly as possible.

The highest possible revenue is only obtainable from an unburdened forest, and it is to be remembered that if we attempt to keep as forest a very large area which would be more productive if devoted to agriculture, we not only lose the land revenue but the conservancy could only be affected in a very loose and unsatisfactory manner. As I intend to discuss only the revenue question, I abstain from entering into further details. The settlement of all rights, whilst keeping the indirect revenue at its present level, must increase the direct revenue in proportion to the increasing population and general wealth of the province.

The total revenue for 1866-67 was Rs. 2,52,373 against an expenditure of Rs. 2,08,140; that of 1867-68, Rs. 2,41,636 against an expenditure of Rs. 2,34,183; of 1868-69, Rs. 2,36,832 against Rs. 1,91,093; of 1869-70, Rs. 3,94,131 against Rs. 7,13,660; of 1870-71, Rs. 9,47,235 against Rs. 11,89,976; of 1871-72, Rs. 7,10,215, spending Rs. 6,97,564; and in 1872-73, Rs. 6,52,995 against Rs. 7,95,942.

The whole transaction shows, according to these figures, a considerable minus balance, not taking even into count the large loss in material, for which we can show no profit.

I will try to analyse and explain some of these figures. We spent during the last three years Rs. 3,15,457 in the plantation division, and the income amounted only to Rs. 63,632. This expenditure was, however, accompanied by an almost universal success, and will, I have no doubt, be repaid.

The expenditure on all other divisions on re-cultivation amounted only to Rs. 30,033. The expenditure in the Rukh Division cannot be called extravagant; it amounted during the last three years to Rs. 4,10,283, and an income of Rs. 6,50,717 was realized during the same period, showing a clear profit of Rs. 2,40,834.

But when we review income and expenditure of our river divisions,—those divisions which have the forests above and the control of the timber transit by river below,—we find that from 1866 till the end of last year the total expenditure amounted to Rs. 36,52,964 against an income of Rs. 32,00,169, proving that we have lost Rs. 4,52,795 in cash alone by working these forests, and it is at least doubtful whether we have counteracted unnecessary destruction to such an extent as to warrant this large loss. The improvement of the hill forests has, up to date, hardly been so extensive or complete as to recoup such an excess expenditure.

It may sound curious, but it is a fact that in several years on most of the rivers it would have been cheaper to Government to pay the whole establishment for conservancy only, and not to work the rivers at all.

This seems to me a certain proof that to continue to work our rivers in the present system, is abetting an unnecessary waste of money and capital.

In June last, when inspecting the work on one of the rivers, the Ravi, I found the most excessive rates for contracts, I most naturally entertained the idea that the expenditure could be reduced to a very large extent by revision of all contract and labor rates, but found on closer examination of the question that it was only the Ravi on which these extravagant rates had been charged. This was, of course, changed immediately, but I think that the Conservator should annually obtain a list of all contract rates and publish it for the general information of all forest officers in his province.

A very large amount of the expenditure,—an amount quite out of proportion with not only the income, but also with the rest of the expenditure,—is swallowed up by the pay of the establishment.

The work on each of the rivers extends over such large areas, that if they are actually to be worked without losing large quantities of timber by pilfering, or jams, or by other causes, it will hardly be possible to reduce the present establishment, which is even now by many of our officers declared to be not sufficient to secure a perfect supervision and protection. But there is no doubt that the work only necessitates this large expenditure on account of the area over which it is spread, and that the real labor and the profit thereof is not in proportion to the establishment; and this can only be altered by a concentration of work, I mean by the working of several rivers with the same establishment.

To do this, the first step to be taken is again statistics sufficiently accurate for the basis of plans of utilization, and when these have been prepared, they have to be fitted together in one general provincial plan. Thus, for instance, the Sutlej and Chenab might be worked more intensely for the next five years, whereas all work would stop on all the other rivers, which, during that time, would require only a small conservancy establishment, giving the officer in charge ample time for the settlement of rights, demarcation, artificial reproduction, and improvements.

Then two other rivers might take the place of supplying the market and so on, moving the establishment with the work.

Such concentrated and more intense working would tend to lessen the actual timber expense, and something of this sort must be done, or we shall shortly be obliged to cease altogether the exploitation of our river forests.

This method can, of course, not come into practice before all the rivers, which are to have the first period of rest, have been cleared of their present transport stock.

MR. WILD.—I am of opinion that if each divisional officer exercised a stricter control over the expenditure under conservancy and working, and could only manage to do the work with a smaller establishment, which I think is possible, and, further, always kept in view the *financial* position of his division, a profit could be obtained. I am also of opinion that a more general use of mechanical powers in place of the present manual labour, and a better system of working altogether, would tend to reduce the expenditure in a marked degree. Further, it is again one of the duties of the State to supply the wants of the people with regard to timber and fuel, and if this supply were only procurable at one spot, the price of the material, long distances off, would be so enhanced as to prohibit its use almost altogether.

MR. RIBBENTROP.—I share Mr. Wild's opinion that much might be done by a stricter divisional control of expenditure, but I am not prepared to second his remark that the work carried on as at present could be done with a smaller establishment. I already noted it in my paper, and I am of opinion that the large establishment is necessitated by the vast area over which the work is spread.

The introduction of mechanical labour, formation of slides, &c., would most certainly be a saving, if the individual hill forests were extensive enough to allow of our adopting these means of exploitation, which necessitate a considerable first outlay, and are either fixtures or difficult and expensive to move; but the Punjab hill forests are so scattered, that in most instances the erection of such works as Mr. Wild recommends would represent a considerable portion of the value of the timber in each forest.

Mechanical power is only economical when the works are extensive enough. Nobody would think of erecting a saw-mill, if he wanted only to convert a couple of hundred logs into beams, and the case is analogous.

The depôt expenditure might be reduced (I know) by the use of cranes and other mechanical means, the price of which would be speedily repaid, but it must be remembered that this expenditure is the smallest item of timber transport.

As regards Mr. Wild's objection, that if my proposals of concentrating the work should be carried out, the State would

not fulfil its duty to the public in so far as the easy supply of material would be obstructed, I must remark that the example given is somewhat of a caricature of my original proposal. It was never my idea to extend the concentration of forest work to the supply of fuel; I proposed to work two rivers in the province simultaneously for timber; and lastly, by closing the work of a river, the depôts would not be cleared all at once of timber, and the supply would not be stopped for some time, leaving private timber trade out of consideration.

Of course, it would be better if it was possible to work all our hill forests at the same time, and to diffuse a steady and profitable supply of material throughout the country; and I do not regard the proceeding I propose as an ideal of the utilization of our forests, but as the child of circumstances forced on us by dire necessity.

Only by the proposed means it will be found possible to make slides and other floating arrangements repay themselves, which is quite impossible, when about 1,500 trees are cut over an area of thousands of square miles, under the supervision of an establishment costing about Rs. 2,50,000. Circumstances avoidable and unavoidable increased our transactions suddenly and artificially forced the growth of the department, and here we are a young lanky overgrown tree, which will never be able to bear fruit in proportion to its size and most certainly wants pruning down in all directions.

It is humiliating to see year after year a budget parading 7 figures in the expenditure and only showing a modest sum of 5 figures as a profit balance. It is no doubt true that we have left undone those things which we ought to have done, and done those things which we ought not to have done, and we have at present to pay largely for former sins; and considering that, excepting the plantation division in the plains, only Rs. 30,033 have been spent in forest improvement out of an expenditure amounting to above twenty-three and a half lacs of rupees, the argument that we work for the future will hardly hold good.

I am convinced that we must gradually concentrate our works, and either reduce our establishment, both European and Native, or find and make some profitable work for them.

We pay annually Rs. 20,000 to the Rajah of Chumba for the use of the forests in his territory, which soon will mean nothing else than that we have the right to improve his forests.

Up to the present these improvements have chiefly consisted in the construction of some very good and expensive hill road and bridges, no doubt of the greatest importance for country, but of very slight use to the utilization of our forests.

A path on which men can walk, and jhula bridges on wires on Mr. Duff's pattern, are in my opinion quite sufficient for the requirements of forest management, if the forest is only connected by a good slide with the floating river, and I should urge the cessation of these works throughout our department.

I have already mentioned the general principles under which budget sanction should be asked for. Firstly, for such works which at once yield a profitable outturn.

In these cases the expenditure should be shown in all its details, and the estimated profits must be based on sound statistics, which it will be most difficult to collect, as a look at the Central Office cash book will show the elasticity of the account heads "A," especially of "AI."

It is not enough to say 300 trees felled at Rs. 4 and 2,000 logs launched and re-launched, and 3,000 logs landed, &c.

I want an estimate for every stage of work, and would wish to see the officers adhering as much as possible to their estimates.

In cases where the work is shown, *proved* to be remunerative, expenditure must not be stinted.

The Government letter I have already quoted mentions the opening and repairs of roads, and the general facilitating of the means of transport from the forests. This is certainly true, but only where the forest and the market are extensive enough to repay the outlay by the larger profits gained by the easier means of transport.

A price should in all budgets be charged for material utilized. In Chumba a portion of the lease money, in Bussahir the price paid for trees, and in our territory the royalty we could obtain for them.

I am not able to estimate the loss of material since 1866-67, but I am almost certain that if this was added, the loss in the river divisions would be near 7 or 8 lacs.

If a carefully prepared estimate shows a profit balance after the loss of material has been added to the expenditure, it ought always to be granted if in accordance with conservancy, but it may in other cases be advisable to grant the sanction even if no profit beyond the payment for the material can be obtained, and in special cases when the payment for material is less than the rates and royalties fixed.

The timber may deteriorate on the ground, or it may be impossible to obtain a sale for it; it may be necessary to clear forest for cultivation or for the reproduction of more valuable trees, and these or other reasons may necessitate the sanction: however, in these cases, circumstances ought to be explained.

For instance, if I submit an estimate for fuel depôts at Amritsur and Lahore. The profits obtained are Rs. 5 or 6 per 100 maunds, the royalty on the wood being considerably more, and Mela Ram, our Railway contractor, would, I am certain, be willing to pay Rs. 5 and 6 per 100 maunds for the fuel in the rukhs.

The reasons why I should all the same ask for the sanction of the expenditure are these:

The royalty is out of proportion to the present value of wood, and only put so high for the sake of conservancy. A contractor would nearly always manage to get more than he pays for; the wood at the price of our present profit would enable Mela Ram to supply the railway at his present rates even after the stock of the zemindars was exhausted, and he would renew his contract,—a contract which we hope to obtain,—and this would deprive us of the profits above the Rs. 5 or 6.

Sanction ought not to be withheld when asked for the building of huts, for the shelter for both officers and establishments, as the health of the men influences the immediate profit.

Sanction for expenditure should not be refused where future profits are clearly shown, or where it is necessary, on account of well-being of the country, to incur an outlay.

This includes demarcation, settlement of rights, surveys, maps, plantations, and forest improvements.

The utility of the outlay on the four first-mentioned subjects is so obvious that it ought always to be sanctioned.

Here I would add the results of a conference between Captain Bailey and myself, as how to make these operations as cheaply as

In a mechanical operation like surveying, the rate of progress depends almost entirely on the number of hours per diem that each man can be usefully employed, and it becomes of the utmost importance that no delay of any kind should occur to interrupt the steady progress of the work.

Before a survey party is sent to work in any locality, all demarcation should be done which it is possible to do without the aid of the map. If the way is thus prepared, the survey can be done quickly, and consequently cheaply.

The surveyors know nothing of forestry, and I do not think that it would pay to teach them anything of this subject, which has no connection with the mechanical part of surveying in which they have acquired skill.

When a surveyor sees distinct marks before him and is told to survey them, he understands exactly what to do, and can get quickly over the ground,—his qualifications are estimated by the correctness of his work and the rate at which it progresses; but if he meets with constant checks, either on account of disputed boundaries or the absence of sufficient marks, or from any other cause of uncertainty, as to where his work should be carried, it stands to reason that his progress will be slow and unsatisfactory, and his work proportionately expensive.

If half of his day be taken up in making enquiries and searching for marks, or in deciding for himself where a line intended to separate two classes of forests should be run, his work will take twice as long and cost twice as much as if it were all prepared for him beforehand.

It stands to reason that boundary marks must be found or made, and lines to be measured must be decided on, before they can be actually surveyed, and for the reasons I have given above, it is much better economy to employ some other agency than that of the surveyors to do this work.

In every possible case outside boundaries should be definitely settled *permanent* marks should be erected, and lines should be cut.

This can, I fancy, be generally done, the exceptions being disputes, about the adjustment of which there exists a difficulty, and possible, changes of boundary involved in the final settlement of rights, which cannot be permanently decided on without the aid of the map.

The cases in which such uncertainties exist, are probably known to the divisional officers. In the former case, both the lines claimed should be cut and marked by temporary pillars, and both can be surveyed. In the latter case, the existing boundary line should be demarcated.

Surveyors can only be called upon to represent facts as they find them, and cannot therefore show temporary pillars as permanent ones,

even under the most solemn promises of their being made permanent hereafter. As it is very desirable that as many permanent pillars as possible should appear on the published map, it is necessary that as many as possible should be erected before the arrival of the surveyors.

When the outside boundaries of the forest property have been thus disposed of, a careful consideration and inspection of the ground will doubtless enable a great deal to be done towards the settlement of internal bounds.

The limits of main blocks will no doubt agree with some natural features of the ground or with some marked differences in the character of the trees or soil, and can in very many, if not in most, cases be decided on before the map is made.

It will also, doubtless, be frequently possible to further sub-divide the forests before the execution of the survey, and any line that can be decided on and marked off beforehand is an immense advantage gained.

The final apportionment into compartments may in some cases, especially near the boundaries, depend in a great measure on the adjustment of rights, which cannot be finally determined until some portion at any rate of the map is completed; but I would lay it down as a general rule, that all boundaries, both external and internal, which can be decided on, should be demarcated, and every possible permanent pillar should be erected before the arrival of the surveyors.

The question of rights as above alluded to, is intimately connected with that of boundaries, the demarcation of which in advance of the survey I have above advocated; and I would also strongly urge that the divisional officers, who must have greater facilities for investigating the subject than any other forest officers, should go thoroughly into the question, and should furnish the officer in charge of the working plan with a statement of all existing rights in the forests under their charge, together with their history as far as it can be ascertained, so that he may be enabled at once to take them into his consideration, and that no delay may occur either in his work or in that of the surveyors owing to their non-settlement.

Plantation and forest improvement require a more careful decision. In the plains where the climatical influence is but local, the outlay can only be justified by showing the actual want of firewood and timber, or by certain proofs, based on statistics, that the transport cost of more distant material will more than outweigh the outlay incurred.

In the higher hills, crowned by eternal snow forming an everlasting power of collecting and gradually supplying water, it is, in the first instance, again the value of the forests and the expected outturn which must decide the advisability of a large outlay.

However, in all hills and mountains the summits of which do not reach the snowy range, the climatical influence of the forests outweighs in most instances all other considerations, and the sanction of the expenditure ought to a great extent to depend on reports by local officers, and should be sanctioned if the beneficial influence thereof is shown, even if no other profits can be anticipated.

The sanction of expenditure under forest improvements ought to be as liberal as possible, subject to the same conditions as mentioned under the heads of plantations—even more so, as it is by far easier and more

rational to improve or convert a standing forest often still rich in *humus* and loose soil, than to plant a bare hill side. Still I know of cases where it has been preferred to try and cultivate a bare hill side in preference to re-stocking half ruined forests in the vicinity, and where money has been sanctioned for the more expensive but not for the cheaper improvement.

After all provinces have been supplied with sanctioned working plans, the budget sanction will be based on these, and I beg to draw here your attention to the following:—

"The Government of India has placed the framing of working plans in the hands of an officer under its own immediate orders, and as the framing of a working plan must include the question of the revenue to be realized, and of the expenditure (both on working and establishments), it follows that the control of the budgets must be removed from the local Governments, or the working plan officer must be placed under the Government in whose province he is at the time.

"However, at present the control and in fact the entire management of the forests is still nominally in the hands of the local Governments, and the officer charged with the framing of the working plans is thus placed in a somewhat anomalous position.

"It is quite possible that the opinion of the local Government on the subject of the management of the forests, of which for years they have had the control, may differ considerably from that of the officer deputed by the Government of India to frame the working plan.

"If the officer alluded to makes a carefully considered working plan, and the local Government considers it inapplicable and declines to adopt it, what will be the result?

It would be interesting to know how the revenue question I have discussed here stands in other provinces, and what has been done with regard to the settlements of rights, &c.

As far as direct revenue is concerned, the North-Western Provinces are better off than the Punjab.

They have not had the same large expenditure on forest plantations as that province, but still with a steadily increasing expenditure both under A and B have not been able to show an equally increasing income.

The present year certainly, due to a great extent to the sale of some three lacs of sleepers, makes an exception, and shows a larger revenue than any other year, with the exception of 1867-68.

The large income shown in the annual report of that province, which filled me with a provincial envy, I found to be mainly due to a mistake in the accounts, amounting to about 4,80,000 of rupees.

All what I have discussed here is, to the best of my belief, applicable to the present state of forestry in this country, but far be it from me to join the general outcry, that the success of the Forest Department ought to be judged according to the direct revenue it brings to the exchequer.

The indirect income and other benefits of forests must never be under-estimated, and means and ways will presently be discussed how to arrive at an approximate idea to what extent Government ought at any sacrifice to maintain the conservancy and protection of forests.

CAPTAIN LEWIN.—In Chittagong, the Forest Department does not realize the whole of the forest revenue, at least one-fourth is collected by the Deputy Commissioner; many sources of revenue are entirely in his hands.

MR. RIBBENTROP.—It is not yet determined what forest revenue is; in my opinion every product of forest land, by which I mean the total area upon which trees grow spontaneously or by artificial planting, should be considered as the source of forest revenue.

MR. DRYSDALE.—The proposal made by Mr. Ribbentrop to credit the revenue derived from the sale of forest produce on waste lands to the Forest Department, is one already introduced into Berar. Only revenue derived from minor forest produce on *cultivated* land is credited to land revenue. But on the general question of crediting the proceeds of waste lands to forest revenue, there are certain points which require elucidation. For instance, would you credit the proceeds of mines?

MR. RIBBENTROP.—No, for they have no connection with the surface products.

MR. GAMBLE.—Do you include lime?

MR. RIBBENTROP.—No!

MR. WILD.—But limestone pebbles, kunkur, etc., are surface products, and are gathered for lime burning.

MR. BADEN POWELL.—If they are surface products and taken from the area which is managed by the Forest Department, the proceeds are forest revenue; but mines and quarries cannot be considered as belonging to the forest, and their revenue is a separate item.

CAPTAIN LEWIN.—Lime and kunkur are not produced or increased by any operations of forest conservancy.

MR. GAMBLE.—No, but they lie on the surface among the trees, and persons are let in to collect them, and require the supervision of the conservancy establishment to prevent damage.

MR. RIBBENTROP.—If a mine or a quarry is worked on a separate organization, it is something unconnected with forests altogether; but if one or two persons are let in by permit into an area organized as forest to collect such pro-

ducts, the revenues from such permits is forest revenue. If otherwise, there would be two Revenue Departments collecting in the same area.

COLONEL PLAYFAIR.—With reference to the Holkar State Railway, which has been already alluded to as an instance of a grant made to another department out of forest revenue, it was said that lime and stones were not forest products, and that therefore no charge should be made for them.

MR. WILD.—In some of the northern fuel reserves limestone is collected from the surface among the trees, but Government decided that the Punjab Northern State Railway might have it free. What would the Government do if private parties made similar demands, and to what head of revenue would they credit the charge if they made one?

MR. B. BROWNE.—In the central fuel reserves, Punjab, I charge Rs. 8 per acre for the collection of the calcareous concrete kunkur which forms beds under the soil.

MR. CAMPBELL.—In short, if lime, kunkur, stones, etc., are collected from the forest area, the proceeds are forest revenue; but if there is a quarry or a mine separately worked, it constitutes a separate estate, and is to be cut out of the forest area altogether.

MR. DRYSDALE.—In order to draw the distinction, it should be considered whether the material is collected in pursuance of a general lease, or merely by permits to remove so many cart-loads or coolie-loads.

MR. LEEDS.—In practice, there can be no difficulty in determining whether there is a regular quarry or not. If it is a large work and obviously out of proportion to the possible value of the area as forest, the land should no longer be considered as a forest but as a tract of land producing minerals, and consequently under the management of the district authorities.

MR. RIBBENTROP.—In the Harz Mountains the Forest Department disposes of the lime and such like products.

MR. GAMBLE.—In the Teesta Valley, Darjeeling Hills, the license for working the copper mine, and also licenses for collecting the 'tufa' deposits, are given by the Deputy Commissioner, while the Forest Department gets the ground

rent of the miners' houses which are on forest land, and, of course, the price of any forest produce consumed in smelting the ore or burning the lime. The copper mine is naturally district revenue, but the lime 'tufa,' being a surface deposit and collected in the middle of the forest, should be certainly forest revenue. As lime in that district is very rare, a considerable revenue might be made.

MR. CAMPBELL.—We are then, I think, all agreed as to the treatment of revenue from these sources: how about cultivation?

MR. B. POWELL.—We are not, I suppose, speaking about permanent cultivation owned by individuals or communities which happens to be entirely inside a forest, that is, surrounded by forest land on all sides. Such land is obviously an estate totally distinct from the forest, and with it we can have nothing to do; but it is a fact that when the forests came into our hand, in many instances we found them to contain patches of land which, though the property of Government, had been cultivated for many years, although pursuant to nominally annual leases.

If it is deemed inexpedient or impolitic to stop the cultivation, then such land should be struck off the forest area and treated as State domains yielding land revenue. If cultivation, pursuant to a permit or rather temporary grant, is allowed within the forest, the proceeds of such cultivation are certainly forest revenue.

MR. RIBBENTROP.—I entirely concur in this.

MR. BROWNE.—Cultivation is often allowed in the fuel reserves of the Punjab, because it not only gets a good revenue but improves the soil for future forest treatment. It is the practice to grant cultivating leases subject to the condition that the land is given up, sown or planted with lines of fuel trees. The leases are conditioned to terminate immediately if there is any misconduct, and the crop is held as security.

CAPTAIN LEWIN.—How would you treat the temporary cultivation in hill forests known as 'Dahyá?' If this was stopped in the forest, there would be no population, for the people could not live, and there need not be a Deputy Commissioner!

COLONEL PLAYFAIR.—What! have you not done with Dahyá' cultivation yet?

CAPTAIN DOVETON.—Fifteen years ago, the Central Provinces was a hot bed of 'Dahyá' cultivation, it is now reduced to about one-tenth of what it formerly was. A little gentle pressure was brought to bear upon the people; they were made to understand how bad the system was, and were induced to take leases of land for permanent cultivation, small advances being given them for cattle.

CAPTAIN LEWIN.—I am also making advances with a similar object.

MR. B. POWELL.—The fact is, that this cultivation is so wasteful that somehow or other it must be put a stop to, just like 'suttee' or any other great evil. It consists in destroying a large and valuable capital to produce a miserable and temporary return. To put a stop to it, is only to anticipate, by a few years, the natural termination of the system which will happen, if the system continues long enough, because there will be no more forest to cut down and burn. In Burmah enormous areas of fine teak forest have been totally destroyed, and although there was a nominal prohibition of cutting 'Dahyás,'—there called 'toungyas' in places where teak trees grew,—the Magistrates only punished the infringement of the rule by such trivial fines that people did not care for them and cultivated all the same.

The only plan is to reserve areas of forest in which this sort of cultivation is absolutely prohibited; and in the portions where it is still allowed, efforts should be made to induce the people to exchange this system for permanent cultivation. It is much to be regretted that in Burmah nothing has been done by the Government in this direction, and it might be easily arranged that while a comparatively heavy revenue should be charged for 'toungya' cultivation, the people should be given to understand that on their changing to permanent cultivation no revenue should be charged on permanently cultivated land for a term of years. Captain Seaton, the Conservator, deserves great credit for having introduced a system which, if established on a large scale, will go far to obviate the evil. He allows 'toungyas' to be cut on the condition that the people plant teak trees 6 feet by 6 feet with the crop; they further

undertake to keep the trees clear of weeds for two or three seasons, when they hand the land over to the Forest Department receiving Rs. 10 per acre. The department pays the revenue charged by the Land Revenue Department for the 'toungya' cultivation. In my opinion this charge should not be paid, but no revenue should be charged for the cultivation; indeed, whenever it is necessary to allow 'toungya' cultivation on this or any other system, the revenue ought to go to the Forest Department as a small set-off against the damage done to the forest. This is not done in Burmah.

MR. GAMBLE.—The revenue for such cultivation in Sikhim is credited to the Forest Department.

MR. B. POWELL.—If toungyas are allowed near reserved forest, the people ought to be made to prevent the fire from the burning material spreading into the reserves.

MR. LEEDS.—The fires in the 'Dahyás' in the Central Provinces are not usually such as to spread much.

CAPTAIN LEWIN.—Also, in Chittagong, the people do not burn in good forest, because the work of cutting down the big trees would be too great. They choose the scrub jungle where the fire would not be dangerous. In Chittagong one square mile of "Dahyá" will yield food for five people. About a lac of rupees has been given out in advances to promote permanent cultivation.

MR. CAMPBELL.—To return to the original definition of forest revenue propounded by Mr. Ribbentrop. I do not think that the proceeds of all forest land can be claimed as forest revenue, at least in the Bombay Presidency. There waste land is either assessed or unassessed (by 'assessed' we mean land set apart to meet extension of cultivation). Any person wishing a portion of the former for cultivation can obtain it, and it is uncertain how long any particular portion will remain waste. While it remains waste, the Forest Department pays no particular attention to it, and has, I think, no claim to revenue from it. With reference to unassessed waste land, much of it produces merely grass and few or no trees. If any portion is sufficiently valuable for tree growing, the Forest Department should have it set apart as forest; but I do not say that the Forest Department has a claim to the revenue of waste land, the main or sole value of which is derived from grass and not from trees.

MR. B. POWELL.—I object to the use of the term 'claimed by the Forest Department,' because this would seem to be as if the Forest Department got certain revenue and pocketed it or divided it out among the officers; then it would be proper to consider exactly whether the Forest Department produced the revenue or not. But that is not my view at all. I deal with the principle of account, not with the departmental question. My idea is, that the Government should regard the total income of their waste land as a fund against which it can set off the cost of all forest work, and at present they stint the work because they assert that the fund is small, while in reality they do not consider the real amount of the fund, and by excluding from it sums which, if the general principle is admitted, ought to be credited to the same head of account, make it far smaller than it really is.

MR. LEEDS.—What is wanted is for the Government of India to take a comprehensive view of the entire yield of their waste lands, and to consider that as the sum total of revenue which goes to meet forest expenditure; they can then determine whether the fund is an increasing one, and whether there is a proper surplus over and above the forest expenditure: this they do not do.

MR. RIBBENTROP.—If they want to draw a distinction between the revenue realized by the Forest Department and the district officers, let them have heads for forest revenue both in the district accounts and in the Forest Department accounts, and it will be the total of these two that shows the real forest revenue.

COLONEL PLAYFAIR.—The forest land is divided into two classes, one of which they place under the Forest Department, the other under the district: the Forest Department are expected to maintain strict conservancy, which frequently means stopping the revenue from grazing and wood; the district forests are not conserved and therefore yield their revenue. It is unfair to charge all the costs of conservancy and reproduction against the Forest Department, without considering the revenue from those lands on which such costs are not incurred. The question has to be looked at from an imperial and not a departmental point of view.

DR. SCHLICH.—It should be considered that at present district forests only are made to yield revenue return, while

forests under the department are managed with a view not to immediate but to future revenue.

MR. B. POWELL.—It will certainly be necessary to sum up the results of our discussion in a resolution on the subject; but before doing so, I should like to read a paper I have received during the progress of the conference from Mr. Ferrars, Assistant Conservator of Forests, British Burmah.

The complaint of the Financial Department, that the Forest Department does not show an increasing revenue, leads to the question—on what principle should the work of the department be judged, and expenditure sanctioned or refused? First of all, what is the work of the department? Briefly this—as the agent of the State, to provide for the State as true and full a use of forest produce as the State can pay for. How far is the use of the forests indispensable and an unqualified benefit? Where does abuse of the forests and ruin of the State's interest therein commence? What criteria exist for testing the soundness of the timber speculations that the State undertakes? Such are the questions that the Forest Department has to solve.

We start with the consideration that the State, being a very long-lived body, *must* take account of wants that will arise in the distant future, and that it *can*, in measuring the profitableness of providing for the future, act from the stand point of its longevity, so that its measures are financially sound when taken all in all, they finally recoup their cost at however remote periods. The provision which we must make for the future is a subject on which, although its importance is admitted, nothing but platitudes are uttered. We require the use of timber now, and shall of course have to provide more and more for time to come; but we want a rational enquiry into both these aspects of the case. We must find out how far we really require all the timber we are destroying now, and what is the positive growth of our absolute want of it. Time is bringing two opposing tendencies more and more into collision,—the essential limitation of the supply of timber, and the absence of any limit to our use for it. We must postpone and mitigate the crisis that impends; but in our plans of to-day and to-morrow, the development or rate of approach of the timber famine is the weightiest and the *practical* consideration. In respect of our more valuable timbers, teak for instance, the worst fears are already entering on their fulfilment. The fact that the need of timber exists and will continue, and that we possess exceptional advantages in point of forest land, points to forest produce as a most important article of *trade*, in addition to its primary value (for home consumption).

Leaving this, we pass to the particular bearing of the principle stated in the first paragraph. If we ask the Financial Department whether the State can afford to invest capital in forest improvement just now, *i. e.*, in the official lifetime of the Government of the day, we shall probably hear that there is but little to spare; perhaps it will even be said that the forest budget is a heavy incubus. To this *we* must not reply that the forests are a revenue-paying department; for, considering the sources of the present revenue, that is no credit to us. A Forest

Department which has a past to fall back upon and live by, as well as the future to provide for, should defray its expenses.

MR. B. POWELL.—This means, I suppose, that as the revenue is derived from material produced for us before we came on to the field, the fact of such revenue is no criterion. We have to consider, first, whether the money we spend to fixing timber into the market is wisely spent, if there is real reason for bringing out which timber we do, and for the rest whether what we are doing is in the right direction.

Forest administration may, indeed, defray its own outlay, and even have a surplus income from the outset; but then there must be favourable circumstances, and these must be turned to good account. Such facilities may exist in India; but, if so, they lie idle.

So much for the object of the Forest Department. So far as it fulfils that object, it is useful; so far as it ignores that object, it is a pretence and an active evil. By useful, I mean to the point. And if the Forest Department does all that is required in its line, and not more or less, then it is entitled to have the expenditure it requires sanctioned.

In the endeavour to discuss the question, whether the work of the Forest Department is rightly directed, or rather how it may be rightly directed, we strike on a primary difficulty. We have no data in India. There is neither a knowledge of facts, nor an acknowledgment of principles on which to deal with facts.

MR. B. POWELL.—Certainly not in Burmah, but somewhere I hope in the department.

We do not know what we want, for we have not tried to find out. Meanwhile, we are essaying all sorts of projects at random. When we look at the grounds on which our forest estimates are based, and the manner in which we ransack one resource after another, as one after another fails, how preposterous it is to entertain hopes of any revenue at all, much less an increasing one. "After us the deluge" has been, I might say, the rule of action of our administrators. If forest management is not to be a succession of catastrophes, it must be through an acknowledgment of true principles, and the will to enforce them perseveringly.

The Forest Department, as agent to the State for its forests, has a two-fold capacity: 1st, that of the banker with whom the State has deposited its capital of timber, wholly or in part; and, 2nd, that of the contractor who undertakes to widen out the old, and to build up new resources.

(1). Are the doings of the Forest Department to the point in the first particular? Is the bank sound? No! at least not the branch of it that I am connected with. To overhaul our books would be a work of itself. I shall content myself with supporting my assertion by a reference to the critical points. It is a fundamental principle of the banking function that we should not pay interest out of capital,—not that this principle was laid down in the agreement between the State

and us, as it ought to have been; indeed, we have been rather encouraged to do as we have done, and the complaint of the Financial Department is only so much more encouragement. Nevertheless, for our own credit we should have observed the principle. By neglecting it as we have done, we have beggared our creditor so far as in us lay. Secondly, in converting his capital into money, we have gone into the market at the height of an utterly unequal competition, and sold at the very lowest figure that could by the nature of the case ever be quoted, instead of letting the improvident competitor run to the end of his line first, as any prudent man of business would do. These two examples explain better what the tests of our soundness should be than any general allusions. The husbanding of a resource is rarely called for alone, but generally mixed up with propagation. Minor detail questions, which arise in connection with this function, will therefore be comprehended in the discussion of the next, because they generally embody considerations that come properly under that head.

(2). How is the nature of the contracts we undertake to be discovered? They must be studied, *1st*, with reference to the value of the proposal; *2ndly*, with reference to the value of the means to be used for carrying it out; and, *3rdly*, with reference to its prospects of financial success. Before proceeding, a weighty consideration must be mentioned, namely, that the epoch which will bring the only practical test of success is nothing short of a generation of trees. The fruits of our own work we never can see, and it therefore behoves us to be doubly careful in calculating the chances of attaining our hoped-for results. Before we can express an opinion on the worth of any forest measure or proposal, we must have the requisite data. By this I mean a knowledge of the *status quo* of the whole forest area. We possess just about as much knowledge of the Indian forests as the Romans had of Britain. A thorough exploration (not to be confounded with valuation) is palpably first in order of the subjects on which the energy of the Forest Department would needs be concentrated, and till the completion of which no proposals could be entertained. There would also be great advantage in ascertaining the resources in timber and land of other and chiefly neighbouring states, as well as the circumstances bearing on their market and their kind of conservancy.

The first point on which to challenge any measure is its importance when compared with other measures. This must be done provincially, locally, generically, and specially. In order to provide a wide field for choice, the Forest Department would have to draw up a programme from time to time, showing the scope that the several districts offered for works of improvement. The next question is, whether the measure is designed to meet a want. This presupposes a careful practical study of the tendency of the age. Foresters have often reared timber to meet their ideal of what ought to be in demand, mistaking a hobby for a conviction.

MR. B. POWELL.—We have every reasonable certainty that teak will hold its own, and that its reproduction and extension are desirable.

We should also have some certainty that our article, when produced, cannot be driven out of the market by another. This implies the knowledge, before referred to, of the timber staples produced elsewhere. It follows that no action should be sanctioned without a distinct object being in view, which object should invariably be to satisfy a particular demand recognized to exist. *Secondly*, comes the character of a measure from a technical point of view. Premising that every plan has its mechanism fully explained with freedom from technicalities, it should lay down first the materials that are to serve as a basis, the area of the field over which operations will be generally or partially distributed; the means of propagation and how they are represented, how far they must be supplemented, if at all, by artificial means, and what prospect there is of an element that cannot be replaced going to loss in the process or the forest degenerating in kind or otherwise. Then comes a point of great importance, whether the degree of energy to be thrown into the work is proportionate to its extent, and whether the result to be produced is ensured. Two alternatives always arise,—of concentrating with the idea of getting results of a high class kind, or diffusing with the hope of making good in quantity what is lost in quality or advantageous position. A one-sided balance is sometimes drawn; the contradiction is perpetrated of combining a very "low pressure" system of regeneration with a "high pressure" turning into money of the timber that was to be instrumental in the regeneration. Measures which promise great influx of revenue in paving the road for their object often belong to this class. (The working plan for the Sittang Division, British Burmah, is a case in point.) The amount of timber made available by a plan is often not an indication of its remunerativeness, but a proof of its unsoundness. Situated as we are, the immediate removal of large quantities of the rarer kinds of timber can never be demanded, and should rarely be countenanced. Next to be considered is the promise of supply. Proof must be given that the means assumed for the object proceed from a right appreciation of the natural phenomena. There may be no question as to the suitability of the site, the merits of the system of cultivation, and its applicability under the circumstances must be discussed. Changes which the measure may bring about are to be remembered and weighed, lest the scheme should cut its own throat. The fertility of the soil must not be assumed on the strength of standing specimens, till it is shown that no change in its productiveness has taken place during their development, and so on. Besides the failures which occur from wrong views on the heads just enumerated, or others of the same class too numerous to mention, disappointments are often due to the inconsistent efforts made at executing the plan. The removal of its originator, the apathy of his successors, or a modification of essential points, often cause a work to lose character, and eventually fail. Let it therefore be understood, before proceeding to sanction, whether the measure does not imply a further employment of means than it enumerates, and whether it can guarantee that the physical facts it assumes are constant or what it makes them out to be, and that the concomitant elements that conduce to the result will sustain themselves adequately for the purpose. Then come the quantitative calculations themselves. They are either general

or precise. There is nothing to be said for the first, of which we have seen something in India. Our so-called valuation surveys, at least as performed in Burmah, are thoroughly untrustworthy. The precise method, which proceeds by calculation of cubical contents, allows less scope for individual fancies, and for slovenly work, while again it admits of perfect control. But against it must be mentioned the fact, that hardly any working plan can be adduced in which the prognostications have practically *proved correct*. Why it can never be made scientifically perfect is, that so many elements enter into the calculation, which cannot be reduced to rule, that the valuator's results may become almost purely arbitrary conclusions. Various expedients have been devised to narrow the margin of individual opinion; *e.g.*, determining such questions as must needs be arbitrarily determined by a council who deliberate in the forest, constructing tables in which the opinion of experts is set down, and the like. Committees, however, get into a humdrum way of deciding, and the tables referred to are in the hands of others than the experts who framed them, only a cover for backing up an actually capricious or absurd conclusion. In reviewing a forest measure previous to sanction, it is therefore necessary to ascertain not only the accuracy of the figures, but the application they have.

The third point now remains. Much of what has already been said, need now merely receive its financial application. For instance, measures that meet a demand will always be paying measures in direct ratio to the demand. A degree of elasticity must be allowed in the estimate of annual expenditure on every scheme. The financial status from year to year is not a criterion of the soundness of a plan. From decade to decade, however, this consideration (the financial status) tells as to the correctness of the estimates made for executing the plan, although it does not throw any light on the prospect of ultimate success or failure. Failure in the working of a plan up to a certain period necessarily modifies these prospects, as it increases the sum of expenditure to be set off against the influx of revenue to be eventually derived. Revision thus becomes needful. The index to the amount of further expenditure that can be risked on the measure, lies in the modified results it may be expected to achieve. The peculiarity of the case, *i.e.*, the unusual circumstances that come into play in forest management, add several considerations to the simple one of supply and demand. These are the future as well as the present value of timber, and the fluctuations in the wages of labour and the interest on the capital sunk. A plan which starts from the tacit assumption that the conditions of the problem will maintain an invariable relation to each other, lacks one essential element of success. The value of the supply of timber that is eventually provided for, must be judged by the value of timber at the time the measure has matured. Although, of course, we must take care to be by a long way on the safe side in such a speculation as this, yet the fact remains before our eyes that the comparatively slight drain on the forests during the last eighty or a hundred years has nevertheless caused the value of timber to rise cent per cent. The only way to grapple with the question in detail is to have a revision of all plans every ten or twenty years, and to amend them by the light of experience gained in the interval. But by systematically overlooking the difficulty

from the outset, it is much enhanced, and results in a perplexed and unsatisfactory financial position from first to last. Where the administration has done all it could to keep down the market value of timber, there has been no scope for the play of the principle above insisted on, and that is why we do not find it taken into account by European Governments. The accumulation of interest on the expenditure is an important detail of the estimate, but is often omitted, because it points to the conclusion that a measure, although it may succeed fully in every other particular, will break down in this, and be, from the money point of view, a failure. Accordingly the anomalous expedient is resorted to of saying that theory and practice are two things that must be kept distinct, or the practice, which is, I suppose, tantamount to common sense, will fare badly. Enough upon this subject, though it is the lyric of the greater number, with whom everything must bow before a fixed idea. The fact is, that if the interest calculation spoils the plan, there is nothing to spoil, and the unsoundness may generally be traced to neglect of the foremost consideration, that of supply and demand; and it will be found that there is really no demand for the measure, or not so great a one as to justify its adoption. One more point remains in judging the soundness of estimates, *viz.*, to ascertain not only if the valuator has counted the costs, but if he has not largely overcounted it, to have a cover for his ignorance and sure that his ends shall meet. The favorite resort for this purpose is the use or rather abuse of figures. Diminutive units of produce, *e. g.*, cubic feet, with corresponding minute money equivalents, to which nominal values may be assigned, are the chief means available for concocting plausible estimates. To guard against danger from this source, the sanctioning authority must have such a knowledge of the subject in all its bearing as to be able to go thoroughly to the roots of the matter.

DR. SCHLICH.—I do not quite agree; it is dangerous to make such sweeping assertions, and some of the principles seem unsound to me; there are no data on which he bases his assertions.

MR. RIBBENTROP.—I go further than that: Mr. Ferrars assumes data on which he bases some of his arguments; for instance, in his comparing the whole of the forests with the capital stored in a Government Bank to be administered by the Forest Department, he says that we have impoverished the creditor by converting his capital into money, but he quite forgets the fact that money bears interest as well as forests. It may be true that the increase in substance and value of a teak forest would yield a larger interest than the commercial interest of the country. Still, it is only an assumption on which he bases his principle.

Again, it is a strong assertion to say that the working of a forest must be quite in accordance with the present and future market. Suppose his timber deteriorates, would it not be

better to sell it at a lower price than not to sell it at all? As for instance in the Dehra Doon, where, should the market not be sufficient for sâl scantling, we might sell it as firewood. He further altogether leaves that view of the question, that a country may have more forest than it requires, either for local export market or for climatological reasons. On the other hand, he seems to forget that it may be necessary for us to reproduce, or even produce, forests more for economical reasons than for those of the market. In one part of his paper he says, that we cannot take the present growth of trees as a criterion for the present fertility of the soil; certainly not, but may it not be possible that the trees grew on a deteriorated soil, which we may be able to improve and thus raise a better crop than the last one. I quote again the Dehra Doon for an example, where this is most decidedly our present aim. Altogether I consider that the paper lays too, much stress on the present and future market, ignoring the other principles of political economy; otherwise I quite agree with its views put forth in this paper. That we must collect accurate data and form real working plans, that it is more dangerous to work a forest in the wrong way than not at all, and that it is better to have a committee to form such plans than to allow the idiosyncrasy of one man to influence the plan, and that the present and future market is one of the foundations, but not the principal one.

MR. B. POWELL.—The paper is so written that it is very difficult to get at the author's meaning; but as regards what he says about want of data, and doing things by guess work, we shall all agree with him. One thing, however, has to be prominently noticed in Burmah. It is the remarkable fact that, while all the forests are Government property, we derive not a penny from any single thing except teak. Millions of bamboos, quantities of wax, wood oil, varnish, catechu, boats, planks, firewood, and hosts of other things, all go absolutely free. Government grants *free* out of its forests in Burmah material to the value of at least 5 or 6 lacs of rupees annually. I do not here discuss the policy: perhaps it is very right to do so. But it is mere folly to talk about increasing revenue without taking into consideration the fact that you give away at least £50,000 a year. Equally absurd is it to talk about revenue, when every log of teak you work out by permit is done at a dead loss of Rs. 4, I think, or thereabouts! Again, it is perhaps policy to allow permit-holders, but consider the cost of your policy. The Executive

Government insists on eating and giving away large slices of cake, perhaps quite rightly so, and the Financial Government wants all the time to have the cake, and see it grow instead of diminishing. In another part of the paper, (printed with the next subject,) Mr. Ferrars has an allusion to salt-making in Burmah. The salt water is charged for by Government; the wood which is used in boiling is not!

DR. SCHLICH.—This looks as if the salt water was exhaustible, but the forests not so. (*Laughter.*)

MR. DRYSDALE.—How do you value the rights and privileges?

MR. RIBBENTROP.—By the amount of material estimated to be consumed, at the known market rates for such material.

MR. B. POWELL.—With statistical data of number of houses, cattle and right-holders, and the average consumption, there is no difficulty in affixing a value.

CAPTAIN DOVETON then communicated some remarks on the *Central Provinces'* revenue.

Viewing the subject as it appears to have been viewed by the Financial Department, the charge is not applicable to the Central Provinces.

Appended are two statements: the first showing the results of each year's undertakings; the second showing the average net revenue for different periods, from the first establishment of the department up to 1872-73. Were it not for the fact that in 1866-67 and 1870-71 there were large recoveries of outstandings from previous years, the figures would show an uniform as well as increasing rise in the net revenue. Considering that the wants of at least one-third of the population have been supplied at nominal rates, these results appear most satisfactory, and the more so when it is remembered that the revenue-yield of the forests when their administration was first attempted, was fully fifteen times less than it should be.

That there is still a further field for the realization of an immediate profit cannot be denied, and in some localities advancement in this respect may be looked for without detriment to the forests. It must, however, be remembered that most of the tracts that have hitherto been most productive in a revenue point of view have been much overtaxed; and though, with a few exceptions, the results are not apparent to a casual observance, no forest officer can fail to observe the necessity of some stringent measures being adopted for the preservation at any rate of the more accessible wooded lands.

Now, if all the forest lands in the Central Provinces were Government property, or rather if the forests owned by Government were the only wooded lands in the Central Provinces, the introduction of the strictest possible system of conservancy need not be attended by a loss of revenue; on the contrary, the introduction of such a system would

in my opinion result in an increase, not only in the gross but also in the net revenue. But Government is not the only proprietor of forest land. The Government forests which cover an area of about 21,000 square miles, are interlaced or divided by above 40,000 square miles of private land, more or less stocked with wood, in which proprietary right has been conferred, and any attempt at a general system of conservancy would tend to transfer the demand from the Government forests to those of private individuals. To what extent this may affect the forest revenue, it is impossible at present to say; but a decrease in the receipts from such produce, as has hitherto been removed by purchasers, appears inevitable; while, to secure the preservation of anything approaching the necessary area of forest, there must be an increase in the expenditure.

By some persons it will, doubtless, be set forth that, considering the large area of private forest, it is unnecessary for Government to do more than secure the maintenance of a supply, of large timber for public purposes. To this I would reply, that most of the more accessible private forests show signs of rapid deterioration. In none of the private forests is conservancy attempted, though in some instances, owing to the low rates charged for produce from the Government forests, the existing crops on the adjoining private forest lands are protected against felling; but this is only a postponement of the evil which appears to threaten at any rate the greater portion of the private forests in these provinces, where the sole object of the owners is to realize the largest possible return in the present, regardless of all future interests or consequences.

If a general system of conservancy for all Government forests is introduced, the more accessible private forests will deteriorate rapidly, the value of the produce of Government forests will steadily increase, and Government will eventually derive a vastly larger revenue than can be hoped for in the present; while it will also have the indirect advantages resulting from the preservation of wooded lands. If, on the other hand, the call for revenue from the Government forests has first to be answered, efficient measures for their conservation cannot be introduced, (for, unless the Government rates be raised, every restriction on felling represents so much loss of revenue in the present,) and surely, though perhaps slowly, the destruction of the State forests must progress. Private forests might thus be preserved for a time, but their fate would be nevertheless certain; for it appears to me hopeless to expect that any large number of natives of this country will sacrifice the opportunity of realizing large sums in the present for the sake of future advantages, some of which they are unable to realize, and which, to some extent, will only affect generations to come. But to take the most favourable view of the matter, the preservation of such forests would be dependent on the will of individuals, and could not be calculated on with certainty.

The choice, therefore, appears to lie between overworking the Government forests, for the sake of revenue in the present, with the mere chance of private forests being able to supply the requirements of the people in the future, and securing the preservation and improvement of existing Government forests at the risk of losing revenue in the present, but with the certainty of deriving a vastly larger return in

the future, and securing a goodly supply of forest produce for future generations.

No actual data exist regarding the present capabilities of the forests or the demand which they are called upon to bear, but the maximum present capability of the Government forests has been roughly estimated at one and a quarter million tons per annum. Less is known of private forests, but area for area they are, on the whole, less productive than those belonging to Government. The total present capability, therefore, can scarcely exceed the demand, which is estimated at 3,000,000 tons per annum. But a small portion of this demand, however, falls on the tracts best capable of bearing it, and it therefore stands to reason that some parts of the forests must be materially overtaxed.

To the conservation and improvement of these latter tracts it behoves us to pay immediate attention; but if this be done, the department should not be condemned for failing to show a large money profit on its transactions, for some years to come.

Statement showing the result of each year's Revenue and Expenditure of the Central Provinces.

Official year.	Revenue.			Expenditure.			Surplus.			Deficit.		
	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.
1860-61	45,812	4	8	17,284	0	0	28,528	4	8	.....		
1861-62	69,250	12	7	46,193	0	0	23,057	12	7	.....		
1862-63	59,189	11	1	60,341	3	8	.....			1,151	8	7
1863-64	66,475	8	10	67,707	0	0	.....			1,231	7	2
1864-65	89,306	12	7	97,556	0	0	.....			8,249	3	5
1865-66	2,02,643	13	4	1,13,498	0	0	89,145	13	4	.....		
1866-67	3,67,095	3	2	1,27,858	3	5	2,39,236	15	9	.....		
1867-68	3,49,491	9	4	2,12,099	2	0	1,37,392	7	4	.....		
1868-69	3,51,013	12	5	2,94,658	12	1	56,355	0	4	.....		
1869-70	3,81,783	10	8	4,73,189	2	1	.....			91,405	7	5
1870-71	6,58,119	10	7	3,07,432	10	6	3,50,687	0	1	.....		
1871-72	4,47,764	1	9	2,31,602	9	0	2,16,161	8	9	.....		
1872-73	4,81,673	7	1	2,47,837	5	10	2,33,836	1	3	.....		
Total ...	35,69,620	6	1	22,97,257	0	7	13,74,401	0	1	1,02,037	10	7

Statement showing the average Net Revenue for different years.

	Rupees.
Average net revenue per annum for the pats 13 years	97,874
Ditto ditto 12 "	1,03,653
Ditto ditto 11 "	1,10,980
Ditto ditto 10 "	1,22,193
Ditto ditto 9 "	1,35,907
Ditto ditto 8 "	1,53,926
Ditto ditto 7 "	1,63,181
Ditto ditto 6 "	1,59,504
Ditto ditto 5 "	1,53,127
Ditto ditto 4 "	1,77,320
Ditto ditto 3 "	2,66,895
Ditto ditto 2 "	2,24,999
Net revenue for 1872-73	2,33,836

MR. B. POWELL.—This shows that the Central Provinces turn out a quantity of forest produce in kind sufficient to produce an amount in excess of the actual expenditure—is that a proof of a sound financial position? Captain Doveton seems to doubt it throughout his note. How do you know, I ask, that you *can* take that produce out? Are you sure that naturally or artificially it is being replaced—every bit of it? Unless you are—and that is the *minimum* of requirement—you are merely satisfying the financial outcry of to-day at the expense of the future, *aprés moi le deluge.*

MR. RIBBENTROP.—Captain Atkinson has a good remark, which I wish to reproduce. He says, as regards grazing and other rates for forest produce, that while land and other commodities have risen enormously in value, these have never been changed. The land revenue has been revised, and, under the latest settlements, has risen 46 per cent.; yet the grazing and fuel rates remain as before.

MR. B. POWELL.—In the first place, I regard the issue of orders which demand a revenue simply, without reference to the *condition* of the estate that is to yield it, as open to very serious objection; so serious as to lay the authorities open to bear the responsibility for a large share of the failure that has been in many instances our lot. If you demand only revenue, and ask why the department does not pay, you assume that it is in a position to pay: now a great portion of it is not.

DR. SCHLICH.—I must urge that the fact of forests existing over a certain area of land representing a certain value, renders it necessary that they should yield a return to the owner. The management of a forest depends on the will of its owner, and in the case of State forests, a surplus should be arrived at by keeping the expenditure below the income.

MR. B. POWELL.—I fully admit that; what I mean is, that if the owner chooses, as the Indian Government has in past years, to let the estate be ruined, and then hand it over to a department to be treated, it must pay the price of its past *lachesse*, and cannot get blood out of a stone. Does the Financial Department know how much of the area we have simply to preserve and replant, how much is in a ruined condition, and how much not? Have they data; in fact, do they know what they mean when they ask for money?

Mr. Ribbentrop has alluded to the case of Chumba. Here we pay Rs. 20,000 a year for the two groups of forest alone, which I do not believe can pay at all, *unless* we do conservancy and not revenue business, and then we are spending money solely for the Raja's benefit. But, had we started with the knowledge that we have now, we might have worked in a different way. As it was, we saw both the Chumba Rivers in a condition of the utmost confusion as regards their timber, and we at once put officers on both to set to work, and they have been doing timber work ever since, and, until quite recently, nothing else. In the same way with all the other Punjab rivers, officers were put on them, because the state of the *contractor's work* was such that it demanded instant interference; and the first effort was directed to timber work, and being once so directed, never could be directed anywhere else.

And another reason for this is, that we began by employing many officers who did not know *how to do* anything else but timber work. The result has been that in Northern India the timber work has barely repaid itself, even in individual divisions of forest. The Punjab figures have been analyzed, and the North-West probably show somewhat better, because there are large items of minor produce which swell the revenue, and because the forests are better stocked, are nearer the markets, and have these markets in abundance. Still it would appear that the large timber operations of past years have by no means been paying speculations in a revenue point of view. The surplus of 1872-73 is, when reduced to its actual dimensions, not greatly in excess of the revenue under the grazing and minor produce heads alone, which amounted to, under Act VI, "sale of fruits, &c.," Rs. 1,68,904; under IV, "permit fees," (whatever that may be, I have not the faintest idea) to Rs. 28,497; under "grazing," to Rs. 25,637; and under "miscellaneous," to Rs. 20,827—a total of Rs. 2,43,865, besides 2 lakhs, which were realized from sale of timber removed by purchasers; this I cannot distinguish from IV, permit fees, as the people who remove standing timber are permit holders. This, therefore, shows that very little has yet resulted from the timber work.

I am very sorry to find that no forest officer from this province has been permitted to attend the conference, though it was held at Allahabad for this purpose, chiefly, among many, that this province might take a prominent part in it.

As far, then, as Northern India is concerned, the demand for revenue and the constant outcry have caused us literally to fall between two stools, to miss the net profit and to do very little for the forests. I will illustrate my meaning by an instance: The Pubbi range of hills in the Jhelum District, traversed towards one end by the Lahore and Peshawur road, is now in parts miserably denuded; the *reboisement* of it is of first-rate importance: the officer in charge admits that very little has been done for it. Why? because he is obliged to pay more attention to the *grazing* revenue. If replanting works were undertaken, the grazing would have to be reduced; therefore nothing is done.

In admitting the failure of the past, it is not necessary to denounce anybody. I think it was inevitable. The work was started by such men as we could get, who knew nothing whatever about their business, and Government only had a sort of vague idea that they had got to prevent the waste of wood, and at the same time to make a *revenue*. The cry for the latter was, of course, the loudest, because the getting in of cash was easily understood: how to really *manage* the forests properly, was not. It is no use, however, now to blame individuals, or attribute the error to this officer or that; the work was new, the men were new and perfectly ignorant, and even the few people who had some idea of the business did not dare to speak out. Ten years ago, many points that are now settled beyond dispute,—to such an extent that one cannot realize anybody having the requisite stock of courage or imbecility, whichever it may be, to question them,—were then regarded as unsettled.

The idiotic nonsense that was written some eight years ago, when first the need of trained officers and of professional skill in forestry was mooted, is something incredible, and may still be read by the curious. But then, in the midst of the stumbling in the dark, it may be reasonably hoped that we have found a footing at last. And during that time also much has been done. I will take the period of my own administration in the Punjab, because I know the subject best, and know well the mistakes and the failures which I made; still some progress was made to counterbalance the failure in other respects. Take the instance of the lease of the Chumba forests. Though the monstrous clause about the Rs. 20,000 was, of course, beyond recall, the management of the forests was put on a reasonable footing, a revised lease was bought out, and a code of rules agreed to, which provided

for the settlement of boundaries and selection of the forests now nearly completed. Conservancy was impossible under the old lease; some attempts were made to put the deodar reproduction on a more reasonable basis, and so forth. Many failures were due to external circumstances. Even if I had appreciated then, as I do now after being convinced on the subject, that the system of river administration was wrong, I could not have done much in the right direction. I was bullied all day long at that time about sleepers for the new railway.

Wood, I was told, must be had at any price. The Government were determined that the State Railway should be opened in 1870, up to Jhelum at least. I and the officers under me would be held personally responsible, &c.

So away went the river officers to work on Chenab, Ravi, Jhelum, and everywhere else; we had to make hurried agreements with Kashmir, to strengthen establishments and push out an abnormal and really wasteful growth in expenditure and establishments. Nor did in those days any help come to us. The Railway officers treated us in a way which now, as it is past and gone, I would willingly forget; instead of helping in the work and recognizing the fact that they were really being served by the same Government that employed them, they did every thing that they could to secure their own interest at the expense of ours, and justice was not to be had: we were the little department and unrecognized, they were the big department and in the sunshine of royal and public favor; we went to the wall. It was only quite latterly, when we could get our case before men like Colonel Pollard and Colonel Drummond, that we got anything like fair play. To give one instance out of many.—I was compelled against my will, in 1869-70, to spend Rs. 90,000 in bringing to Nowshera timber that nobody wanted, and that was designed for a railway which was not sanctioned, and which, if it had been sanctioned, could not have used wood in that place; and will you believe me, when I say, that I had the greatest difficulty to prevent the Forest Department from being saddled with the loss.

The continuation of the bad system of working all the rivers together, and at the same time gleaning our scattered timber supply over an enormous area of forest, was in fact forced on us by circumstances. But, whatever may be the excuse for the past, we must now determine resolutely to pull up and to save the State from further mischief.

But to enable us in future to act properly, the Financial Department must consent once and for all to cease a general outcry for *revenue* and raise it for *true economy* instead, as loud and long as they please.

We must first of all understand our position; and the collection of statistics is the first thing. We must distinguish places which ought to pay from those which cannot, and then define the principle, once for all, of what is forest revenue; next, insist on true economy, not money, and see that if a forest is, as regards the stock available, in a position to yield, that you do not work it without knowing that it will pay, and without securing your market. After that, do not grudge money spent for really useful works of plantation and restoration.

The conference then unanimously recorded the following:—

RESOLUTION.—That this conference represents to Government, with reference to the recent complaint of the Financial Department, that the forests do not show an increasing revenue; that under any circumstances it cannot be correctly said that any certain ground exists for the complaint, because it has never been determined *what is* forest revenue, so as to institute a comparison between that revenue and the forest expenditure.

The reasons of this are two:—

1*st*.—The *direct* forest income is not taken into account properly. The conference deprecates the present practice of crediting direct forest revenue partly to one head of account, "Forest," and partly to another, "Miscellaneous Land Revenue."

And they urge that all forest revenue, that is, all the income from surface produce of the waste lands, whether major produce, as timber, firewood, charcoal, or minor produce, as India-rubber, soom tree revenue in Assam, bamboos, lac, mohwa, grazing, &c., &c., should be credited to the same head of accounts, "Forests," whether that head appear in the district accounts or in the departmental accounts; unless this is done no correct results can be obtained. In illustration of this proposition, the conference would refer to the figures which were set forth in the Financial Department communication, and point out that they compare the total or very nearly the total of *all* forest

expenditure in India, with a *small portion* only of the actual forest revenue, being that portion which, by pure hazard and on no principle whatever, happens to be credited under the "Forest" head of account. Many items that in one province go to "Forest," are in others credited to "Land Revenue," and *vice versâ.*

In the second place, the conference represents that the indirect revenue, or value of what the forests yield, should be taken into consideration in estimating what the State derives for its forests; and that this is not done at present.

This indirect revenue consists in the value of grants of forest material, either free or at nominal or reduced rates, to the Military, Commissariat, and other departments, but chiefly to village communities and individuals.

That these grants are not made on the basis of any right, (which diminishes the property of the State *nolens volens*,) but are made by the policy of the State, from motives of public convenience, for promoting the content and happiness of the people, and so forth; and that therefore the estimated value of all these (amounting to a *very* large sum) should be taken into consideration. For, if the State so willed it, the whole might come into its treasury as cash revenue. If, then, the State voluntarily grants it away, it ought to remember what it gives out, as well as what it retains; especially when the very important fact is recollected, that not only does the grant of such privileges reduce the revenue directly by the value of the grant, but indirectly, to a very great extent indeed, by destroying the market and causing a cessation or reduction of demand for the produce that is brought out of the remaining forests.

The conference would invite attention to another point bearing on the question of the amount of forest revenue; and that is, that as the present revenue is obtained by extracting quantities of material of all kinds from the forest, it is impossible to estimate the true financial position, until it is ascertained what proportion the actual yield (which produces the revenue)bears to the highest possible permanent yield, or, in other words, to the maximum that the forests *ought* to yield. If the actual yield is *more*, then we are trenching on capital, and even a large surplus result from such a course is a very unsound position; if it is *less*, then the Financial Department have every right to call for more returns, but this neither they nor we as yet know; and the conference represents that the true policy would be

to stop expenditure on all but absolute necessities, and insist on knowing this proportion first of all; whereas by allowing expenditure and merely demanding more revenue, they throw a strong and dangerous temptation in the way of forest officers to make more money than they ought.

Moreover, the ascertainment of the proportion between the actual and the true or proper possible yield, is necessary to enable us to judge whether our works in promoting artificial and natural reproduction are merely sufficient to replace the material removed, or are increasing and extending the forest resources; without this knowledge it is impossible to estimate the true financial position.

Consequently, the conference urges that no time ought to be lost in collecting, on a defined system, uniformly in all provinces, the statistical data on which alone a reasonable system of forest management can be based.

That to carry out this, the present survey and working plan branch of the service should be re-organized in the spirit of the separate resolution on the subject, and in particular by setting apart a portion of the general staff everywhere for the work.

Turning now to another branch of the subject, the conference recommend that it should be prohibited to undertake any timber works, unless there is a reasonable certainty that they will pay.

That expenditure on forest works, plantations, roads and communications, saving only absolute necessities, should be curtailed or stopped until such time as the statistical data (to be collected as before recommended) place us in a position to know that expenditure on those works is remunerative either for the present or for the future.

By remunerative, we mean yielding a return either in money or in some other benefit which the State is willing to consider as equivalent to money.

As a corollary or appendix to this resolution: —

The conference deprecate the arbitrary fixing of fuel and timber prices in Sindh and elsewhere; they also deprecate the imposition of local cesses on the imperial revenue, without a distinct entry in the accounts; also the fixing of rates below the market value or the grant of free produce to certain works, as, for instance, to the Indus Valley State Railway—such grants having a direct tendency to show the work of one department profitable at the expense of another department.

SUBJECT IV.

THE ASCERTAINMENT OF THE FOREST AREA REQUIRED IN EACH PROVINCE.

DR. SCHLICH then opened the next subject with the following paper :—

What are the practical means at our disposal to arrive at a reasonable knowledge of the proper area to be preserved and treated as forest in each province; this being, of course, the basis on which a real estimate of a just expenditure and establishment scale, &c. can be made?

The subject which I have been called upon to initiate, in conjunction with my friend Mr. Ribbentrop, may appear at first sight to be a comparatively easy one; but on close inspection such an opinion will soon be replaced by the conviction that it is almost impossible to answer the question at issue even approximately, except perhaps in a few special instances. To fix the area required for forest in any one province, it is necessary not only to take into consideration a large number of factors or influencing circumstances about which our knowledge is sadly deficient at this moment, but it requires also a host of statistical data regarding the requirements of forest produce in a province, and of the quantity of such produce which the unit of area is capable of yielding under a certain treatment, and I need hardly add that these data are not at our disposal as yet. Moreover, it must be borne in mind, that the forests or jungles in India, as in all other countries, belong partly to the State, partly to communities, and partly to private parties; consequently the next difficulty is to ascertain what portion of the required forest produce is likely to be provided from private forests, and what portion would have to be secured by Government agency.

To decide upon all these points is beyond our present means, and I fear you will, by listening to me, become little the wiser regarding the *practical* means at our disposal. However, it is high time that the question should be taken up, and I may perhaps advance the subject by entering upon a short enumeration and discussion of the several points of importance, with the view of starting a regular system of collecting the data, with the aid of which this knotty question may be answered hereafter.

The subject may be considered under the following headings :—

I.—What functions have forests to fulfil?

II.—Who is to provide the forests, private parties and open competition generally, or to what extent is it the duty of the State to preserve and rear forests?—and

III.—How can we ascertain the area required for each province?

To begin then with the first section, we have to consider—

1*st*.—The functions of forests in the household of nature, and

2*nd*.—Their functions in the economic household of man.

It would lead me too far to discuss here, in detail, the influence which forests exercise in the household of nature, and I restrict myself to some of the chief points. Moreover, the extent to which such influence is really exercised, is, in many instances, not at all ascertained with any degree of certainty, and I have no desire of venturing upon individual assertions which it might be difficult for me to substantiate.

In the first instance, forests, as part of the general vegetation, exercise a considerable influence upon the constitution of the air. The everlasting oxidation deprives the air of a portion of its oxygen, and some *savant*, whose name I forget, calculated once that the existing quantity of that commodity would last for about 134,000 years, after which all animal life would cease, if oxygen was not continually replaced. Although the time mentioned is pretty long, and though we in our time should not be likely to suffer from a stoppage in the replacement, still it is some comfort to think that those who are likely to come after us may be enabled to enjoy the pleasures of this life in the same way as we do. Forest vegetation by decomposing the carbonic acid,—retaining the carbon and exhaling the oxygen,—contributes to a very great extent towards keeping up the *status quo* in the composition of the air.

Next comes the temperature. As the cover produced by forest prevents on the one hand a greater or lesser portion of the sunbeams from reaching the ground, and on the other hand reduces the radiation of heat, it follows that the temperature in wooded tracts is lower in the day, higher in the night, lower in the hot season, somewhat higher in the beginning of the cold season, and lower again towards the end of the cold and beginning of the hot season, than in woodless tracts. The annual mean temperature is lower in forests than on open ground. On the whole, it may be said that forests make the climate somewhat rougher, but of course other influences may disturb this general rule.

The influence of forests upon moisture is of the highest importance. It is assumed that forests increase the rainfall, by reducing the temperature, and thus leading the air towards the dew point, by interrupting and retarding the velocity of the clouds, and on account of the air in forests being richer in relative moisture than outside. To what extent these peculiarities really affect the rainfall is not determined. On the whole, it may be said that forests in the plains have little influence upon the rainfall; whereas in hilly countries, wood clad ranges certainly interrupt the current of the clouds, and thus contribute towards an increase of rainfall in special localities. In the greater portion of India, the rainfall depends on the monsoon, and it naturally follows that the importance of forests in this respect is limited.

On the other hand, the influence of forests upon the proper regulation of moisture is great, by their preventing the rapid collection of the rain water in streams, and thereby securing a regular supply of spring water, which feeds the streams at the rainless time of year. Moreover, their existence prevents or reduces inundations, and the surface soil on slopes from being washed into the streams. Much has been said for and against these functions, and a final conclusion on all points has not been arrived at as yet. Some instances of striking features are known, of which I shall mention two. Alexander Von Humboldt, when visiting in

1800 the valley of Aragua, in Venezuela, found a lake fed by the water from the surrounding hills. The latter were originally covered with forest, and the inhabitants lived chiefly on fish procured from the lake. For some time before Humboldt's visit the forests on the hills had been systematically cut down, and the people observed to their terror that the lake became smaller and smaller, threatening with a falling off in the supply of fish. Humboldt came to the conclusion that the devastation of the forests was the cause of the water failure; and when Boussincoult visited the valley in 1825, he found that the jungle on the hill sides had grown up again, and that the lake was on the increase, showing the influence of forests upon the regulation of moisture. The destruction caused from time to time by the inundations of the Rhone in well known to have been brought about by the devastation of the forests in that valley. When the question was brought up—what should be done to prevent future inundations—it was suggested, instead of re-stocking the hill sides, to construct embankments all over the Rhone Valley, behind which the rain water might be collected, and whence it could gradually be let into the streams. Hereupon the French engineers betook themselves to calculating the cost of such an undertaking, and very soon proved that all the money in the world would not be sufficient to carry out the scheme successfully. After that, the necessity of re-stocking with forest was admitted, and since then, I believe, many hills have been replanted, proving the wisdom of preserving the original forests in similar cases.

The scarcity with which Bengal is threatened at this moment brings this subject home to us in the most forcible manner. The rain-water which falls in India, rushes in most instances immediately to the streams, swelling them temporarily up to an immense size and height, and leaving large numbers dry during the rainless season, when the supply of water becomes of such importance. This is caused partly by the peculiar configuration of the country, but also partly by the barrenness of the greater portion of our hills. It will be a matter of the highest importance to consider what can be done to improve this state of affairs, with the view of creating a more regular supply of spring water to feed the streams, which, in their turn, supply the irrigational channels so necessary for this country.

MR. McL. CAMPBELL.—I can give an instance in Ratnaghiri District (Bombay), where creeks, which were navigable as long as the hills (Western Ghâts) were covered with trees, are now silted up, the rain water having, as soon as the forest was cut down, washed all the soil off the hill sides and deposited it in the creek beds. Instead of wooded slopes and navigable creeks, we have now barren hills and shallow streams, which are of no use.

MR. J. S. GAMBLE.—It would be supposed that in Sikhim the vegetation is so dense, that denudation would be impossible; but it is quite the reverse. The forests above Kurseong have been cut up. Formerly, the planters say, there was deep

soil, and the "joras" or streams were gentle and perennial; now, as one passes along the cart road, you can see the tea-plantation grounds on the slopes below strewn with boulders, from which the soil has been washed away, and the streams run only during the rains as violent torrents, showing dry boulder bed all the rest of the year. When they do come down, they break up the roads and carry away the soil.

MR. B. POWELL.—Another instance may be seen on the cart road from Simla to Kalka. I should like to know how much it costs annually to keep that road up, and restore the great gaps that are made, and the bridges and culverts that are carried away by the force of such torrents. I have recently examined every mile of that road as to its vegetation: it is deplorable. But as you come near Kalka, you may see some hills preserved by the Raja of Patiala: here there is vegetation to the summit, and plenty of bamboo; in this tract you may see perennial streams, while directly you go beyond, every thing is dry.

Another function exercised by forests is, that they prevent the formation of avalanches, by which, however, only a small portion of India benefits.

Forests have certain influences upon the wind, which may be beneficial or the reverse. They keep out hot or cold winds in some instances, and perhaps beneficial winds in other cases. In particular, by interrupting the free circulation of air, they make many localities more unhealthy than open tracts.

It has lately been stated that forests of an Australian tree, *Eucalyptus globulus*, reduce the feverishness of certain localities by absorbing and exhaling moisture.

And before concluding this subject, I must not omit to remind you that forests improve the artistic beauty of countries, and that they produce thereby a favorable effect upon man's mind, which I shall leave to each member of this conference to paint according to his own fancy.

I now proceed to (2nd) the functions of forests in the economic household of man. These are exercised on the one hand by their products, and on the other by their being objects of industry and enterprise.

Of the products, wood claims our attention first. It is used as firewood for domestic and manufacturing purposes, and as timber generally. Where coal, peat, and other substances, as for instance cow-dung, are available, firewood can be mixed, but over the greater part of India it is indispensable, owing to the expenditure which the use of coal would necessitate. The people of India for a good long time to come will chiefly burn wood.

CAPTAIN DOVETON.—Seeing that want of manure is one of the chief obstacles to the improvement of cultivation in India, the importance of a cheap supply of wood fuel cannot

be overrated; by this means alone, the consumption of manure as fuel can be prevented.

For domestic building purposes small timber and bamboos are required; for manufactures, communications, building purposes, &c., we want timber, although iron and steel have replaced it to a large extent. The question of interest to us is, how much of these matérials do we require in a particular province? For large undertakings this question can easily be answered. Where, for instance, a railway is to be constructed, the engineers will easily enough give us the number of cubic feet of timber and fuel they require; but who can tell what the average requirements of the people of a district in India may amount to. In many parts of Europe, data of this kind have been collected. Thus, for instance, in Hesse Darmstadt we know from actual experience that the average yearly consumption per head of population amounts to—

Firewood	... ...	36·5 cubic feet
Timber	... ...	4·4 „ „
Total	...	40·9 cubic feet

and it is a mere matter of calculation to ascertain the total requirements of the country. But here, in India, we have at this moment nothing to go by, beyond general estimates.

Besides wood, we have to consider the requirements of the so-called minor forest produce. Some of these, as grass, fruits, &c., in Sindh, Central Provinces and other parts, are of such vital importance that they must be taken into consideration when fixing the area required for forests. Others, as rubber, lac, &c., are mere articles of trade, the production of which need not be effected in any particular district, and the forest area will depend in this respect on the wishes of the owner, as to what extent he intends producing these articles.

The question of forests as objects of industry is very complicated, and it would be impossible to treat the subject exhaustively in this paper. I shall restrict myself to a few words. In the first instance, forestry requires certain areas of land, which represent a certain value. Then, again, forest cultivation enables us to use land, which otherwise might be useless or almost so. In addition to the value of the soil, we have the growing stock of material, which in most cases represents a much higher value than the soil. Forest management gives employment to large numbers of people, which is frequently essential to the well-being of the inhabitants of certain districts. And, finally, forests are a source of income to the owner, or at least ought to be so. The value of soil and growing stock represent a certain capital, which, from an economic point of view, should be so managed as to return the highest possible interest.

MR. B. POWELL.—I fully understand this, and agree to it; but some of our financiers will take it up from a wrong point of view. Our forests have, in many cases, been handed over to us in such a condition that they *cannot* pay. My chief complaint against the Financial Department is, that,

totally ignoring this fact, they have kept on crying out for "revenue," instead of insisting on knowing first what forests are in a condition to yield, and what are in such a condition of exhaustion as to admit of nothing but complete repose; and in many instances more than that,—of nothing but being replanted and restored at a considerable expense, in which case 'revenue' is an impossibility.

I now come to the second part, who is to provide the forests, private parties and open competition, generally; or to what extent is it the duty of the State to preserve and rear forests?

To answer this question satisfactorily, it will be necessary to understand clearly the nature of forest management. As we have seen above, forests are preserved or cultivated partly on account of their climatic functions, and partly on account of their products. The latter form the more important consideration; and as the products are, on the whole, brought into the market in the same way as other articles of consumption, we must look upon forest management chiefly as a trade, and the principles which are to guide it should be as near as possible those of trade in general. Now, in these days we can hardly recognize any other principles as correct but those of free trade, and it would follow naturally that the providing of forest products ought to be left to general competition, and that it is a false principle if the State as such sets up a trade on its own account which would seriously disturb the principle of free supply in the open market. But there are certain considerations which make it necessary in this instance to set the principle of free trade aside to some extent. Most trades or industry in general produce their products in a comparatively short time, at the utmost within one or a few years, and an increased demand will at once cause increased production, so that private enterprise may safely be left to regulate the market. To create forest products, on the other hand, requires, as a rule, long periods, up to 200 years and even more. If, therefore, the supply should fall below the demand, it would be impossible to satisfy all requirements except after a long time. Moreover, forests give, as a rule, to the owner only a small percentage on the capital value of the property, and the consequence is, that private owners are much tempted to reduce and even to sell off the whole of the growing stock and to put the sums realized out on higher interest. Then, again, if the owner is hard up for money, he is only too likely to help himself, by anticipating cuttings for a number of years, whereby the market may become overstocked for a time to be followed by want of forest products. Again, private owners will cut down their forests with the view of bringing the land under cultivation, and so on. Consequently it may be said, that only in very rare instances the regular supply of forest material can be left to private parties, and that it becomes the duty of the State to take such measures as will cause a regular supply, so far as it is not likely to be provided in the open market. Moreover, the State will have to preserve or create forests whenever required for climatic purposes. To sum up, then, it may be said:—"That, in the first instance, the preservation and "creation of forests should be left to private enterprise, but that it

"becomes the duty of the State to step in whenever the former is not "likely to reach the extent required for the well-being of the people."

In proceeding now to the third part—how can we ascertain the area required for forest in each province—we have chiefly to take into consideration—

1st.—Whether the forests have to fulfil functions regarding the climate, especially the distribution of moisture;

2nd.—How much forest material, and of what description, is required; and

3rd.—What is the average yield of such material per uint of area, say per acre?

If these questions could be answered in the case of our Indian forests, the solution of the whole problem would be simple enough. But unfortunately the second and third points remain almost totally unanswered, and regarding the first we can only form a general idea. The climatic functions of the Indian plain forests may, for the present, be left out of consideration. In the hills, and especially in the Himalayas, it should be a recognized principle to preserve as much forest as admissible with due regard to other requirements. In particular on the upper parts of the ranges and along water-courses forests should be preserved or established, and the area of land under forest should certainly not be less than one-third of the total area.

The quantity and description of forest produce required, has to be considered separately in each instance. In most parts of India the requirements of the small man are procurable without any interference of the State, and this circumstance makes the question to be solved easier than it would otherwise be. Of the quantity of large timber required, an approximate estimate can be made. So for Bengal, excluding the eastern districts, it has been said that the total quantity of large timber used amounts to about 60,000 tons of 50 cubic feet each per year.

Regarding the average yield per acre under a certain treatment, I may say, we have no data of moderate accuracy even, and the sooner we begin collecting them, the better. I need hardly mention that such a collection will involve a great amount of labor and time, and that we should therefore at the outset not go too much into details. As matters proceed, the statistics may be made more and more minute. I should propose the following plan, wherever the object is to ascertain the forest area required in each province:—

1. It is necessary to ascertain the area of the province.
2. Population and distribution over the province.
3. Establishments which require large quantities of forest material, as railways, steam navigation, factories, &c.
4. Export, whether other provinces are dependent on the one under consideration for forest material, and if so, to what extent.
5. Quantity of forest material required per year—
   (*a.*) For domestic purposes.
   (*b.*) Other purposes within the province.
   (*c.*) Export.

These data should be ascertained, if possible, in detail, as fuel bamboos, small timber, large timber, minor forest produce, &c. In particular, it should be stated at what points the material is chiefly required.

6. Forests available from which the requirements of the province can be obtained; their position and distribution over the province, or their relative position to the market, if outside the province.

7. Statement as to whether the forests are sufficient to exercise the necessary climatic functions, or whether and where additional forests should be established. Where private forests are of importance in this respect, it must be considered whether the latter is of higher importance than the outlay required to protect the forests from devastation.

8. Estimate of quantity and description of forest material, which it is safe to leave to be supplied from private and communal forests, and of quantity and description of material to be provided from State forests.

9. Description of State forests in detail, estimate of yield under different methods of treatment, and comparison of the data so obtained, with the amount of material required. If, for instance, the forests are capable of yielding permanently all that is required without any conservancy measures, it would be waste to introduce such; then, again, what is required may be simple protection against theft and injury generally. In other cases, where extension of forest area is impossible or difficult, it will be necessary to subject that available to such a treatment as to derive the maximum quantity of material from the area given, and in all cases the only true principle of forestry, namely, to secure to the owner the highest possible interest on his capital with due consideration of all other points of importance, should never be lost sight of.

10. In order to come to a conclusion on the points raised above, it will be necessary to collect data regarding the rate of growth of forests under different treatments. Until we have made some progress in this respect, we shall work entirely in the dark. It would lead me too far here to discuss the system according to which these data should be collected, but I hope to take the subject up in an article to be published in one of the first numbers of the proposed forest periodical.

MR. RIBBENTROP.—From the remarks made during the reading of my friend Dr. Schlich's paper, I must draw the conclusion that the conference agrees to the general principles put forth in the treatise.

The direct utility of forests, of course, is an acknowledged fact, and it is not required to enumerate the many branches of industry and the professions which flourish in proportion to the

cheapness of wood; it is hardly necessary to point out how much easier it is to import grain than timber. However, there is no doubt that the direct utility of forests in the plains of this country is but small in comparison to this utility in colder climates, where the very existence of the population depends on forest produce; but as the direct utility of forests in a country decreases, the importance of the indirect use seems to increase in a similar ratio. Forests, no doubt, beneficially influence the moisture of the air, the rain-fall, and consequently the general fertility of the country.

This influence on the climate is maintained by numerous examples; some of them have been alluded to in the paper just read, many others are set forth in Marsh's "Man and Nature," and we have already had opportunities of making the same observations in this country. The evaporation from forests is much more equable than from cultivated or barren land. The fall of the rain is partly broken by the branches and leaves, and is stored up in the mosses, humus, and low vegetation; the fall of dew is regulated by the vicinity of forests. Of this we have a clear proof in the Punjab, where we have a large dew-fall in the cold weather, even in the treeless and desert tracts, but none during April, May, and June; whereas in and close about the plantations a dew-fall may be observed throughout the year. Dr. Schlich has already given the example of the Takariqua Lake in Venezuela, and I may add that the history of the Fucino Lake in the Abruzzes shows exactly the same results in consequence of the same conditions. The only difference is, that the lake being in a more temperate climate, the changes are slower and less abrupt, and this would tend to strengthen my opinion that the injurious consequences of forest devastation are more rapid in a tropical than in a temperate zone. These two examples, where the water-level of the lakes depends altogether on rain-fall, show, I think, sufficiently that the actual amount of rain-fall, dew, &c., must have been decreased and increased with the devastation and restoration of forests, and that the change in the water-level could not only be due to the greater water-retaining power of the forests. However, this power of absorbing and retaining moisture is largely developed in forest land, and it is by means of this power that the forests form steadily supplying reservoirs for lakes, rivulets, and river. Mr. J. Campbell, I see, mentions instances in Rutnaghiri, where creeks were once navigable as long as the hills were covered by

trees, but which are now silted up, the rain water having, as soon as the forests were cut, washed all the soil of the hill sides and deposited it in the rivers. Instead of finely wooded hill sides and navigable creeks, we have now barren slopes and shallow streams. Mr. Gamble cites an instance from another part of India. He says, that in the Kurseong Forest, Darjeeling District, in place where the soil was deep, and the forest intersected by perennial streams, the denudation of the hill sides, which are now covered by tea plantations, caused the soil to be washed away; the slopes are now covered with boulders; the once perennial streams are now torrents during the rainy weather, which destroy the roads and break their banks, and nothing but dry boulder beds during the dry season. I have made similar observations in the Punjab. In the Hazara Valley small perennial streams have ceased to flow, as the hill sides from which they sprung had been denuded of forest growth, and Captain Ommaney, now Commissioner of Peshawur, made the same observations when Deputy Commissioner at Abbottabad. At Kalatop, a forest in the Punjab, two nullahs, the Bungrotah and Batrinullah, run parallel to each other; the formation, length, and slope of these nullahs is nearly the same; but where, as the Bungrotah Nullah, which takes its source in a small well-grown forest, forms a perennial stream, that of Batri springing from a grassy slope is nothing but a rain torrent. I think it quite unnecessary to give any more of such examples, but would ask any disbeliever to go out after a severe rainfall and compare the quantity and quality of water flowing from a forest and from waste or cultivated land.

The theory of these observations is most clearly proved by Baurath Gervig of Karlsluhe, who has made the most careful experiments regarding this water retaining power. Five parts of ordinary forest moss can absorb thirty parts of water within ten minutes, which is equal to a column of water of 4·466 millimetres or 0·1756 inches. In mountains where mosses grow more luxuriantly, the column of water thus detained by the forest soil was found to reach 10 millimetres. If we add to this the large amount of water absorbed by the lower soil, it has been found that 2 to 3 centimetres or, under favorable circumstances, even an inch of water has been absorbed. An area of 16 square miles of forest can absorb and retain 43 to 64 million cubic feet of water, which otherwise would have rushed down the bare hill sides.

MR. B. POWELL.—We have also to consider the mechanical force with which especially a tropical rain strikes on the surface;—a force which is broken and distributed by the effect, first, of the leaves and branches over head, then by the moss and herbaceous covering underneath, whose absorptive power has been described.

No wonder soil is washed away for an unprotected surface when it is recollected that every inch of rainfall per acre represents a pressure of one ton.

The force of brief rain floods is simply marvellous. In 1871 I visited Kulu (the valley of the Upper Beas), and found many places, which I recollected from previous visits as charming green grassy levels, studded with alder trees between the hills and the river bank, now covered with a mass of pebbles all over, interspersed with huge blocks of syenite, several tons in weight; all this devastation caused by torrents, which at the time I saw them, after the rains were over, were little rills scarcely visible between the stones.

MR. B. RIBBENTROP.—With this acknowledged theory and the many examples we can point out, I cannot understand that a disbelief should still exist in many quarters, that the large rain floods in our Indian rivers and the subsequent droughts are to a great extent due to the destruction of forests: we see the same in Europe. Bohemia, Galacia, Hungary, and Italy, have suffered extensively during 1872, because the forests around the sources of the large streams had been thrown open to the market and been ruined in an incredibly short time. I do not at all deprecate, nor even disbelieve, Dr. Schlich's remark, that the present drought and famine in Bengal is due to similar causes; and if this should be the case, we have all reason to look forward to a frequent repetition of the same evil. Captain Lewin, Deputy Commissioner of Chittagong, says that in his district 60,000 people depend on dya or joom cultivation, thus five inhabitants making a precarious livelihood per square mile. Of course, such cultivation is much more pernicious to a forest than the severest cutting for export, and many have to suffer for a questionable benefit to a few.

It is, therefore, certainly the duty of Government to preserve or create the necessary amount of forest, and I maintain even to require the assistance of private individuals and communities in this work of preservation. I could only repeat the same argument as already brought forward, why the

forests should not be treated on the free-trade principle. But to make forest conservancy really pay, it requires a considerable area of forest and large capital, command of technical knowledge, and of educated judgment; there is no speculation in conservancy, everything goes by fixed rule, and the interest on capital and work show but rarely the same results as if spent in other industrial enterprises. Now, to find out how Government has to interfere, we need statistics; we require to know the present forest area in our and feudatory territories, not only as regards Government forests, but also leased, communal, and private forests, as already enumerated in the last paper (Dr. Schlich's). The greatest importance in collecting these statistics attaches to the hill forests. The Punjab has, for instance, a larger interest in the preservation in the Kashmir forests than Kashmir itself.

I have but little doubt that when all the lower hills were covered with virgin forest, the "bar" lands of the Punjab were richly cultivated districts. The numerous village sites, and sites of pucka wells throughout our bar land, lead me to entertain this opinion.

When all the statistics enumerated in Dr. Schlich's paper are collected, we shall find that there is either a superfluity of forests, that the forests suffice, or that the area is insufficient. Each of these conditions involves a different action, and I have treated more widely on the subject in a pamphlet on the political economy of forests, which will shortly appear in print. But little has been done as yet as regards reliable data regarding forest area, market, rainfall, climatic influence, and all other subjects, and I think that if this duty devolves on our working plan party, it may take a century or two to finish the statistics of Indian forests, if the rapid destruction of the still unsettled forests does not accelerate its work. I quite agree to the resolution put forward by Dr. Schlich with regard to the remodelling of the working plan division.

In the Punjab and its feudatory states we have three different classes of forests,—those in the higher hills, the summits of which are covered with eternal snow, those in the lower hills, and the rukhs and plantations in the plains. The forests on the lower hill range are no doubt those of the greatest importance for the under-lying country, and at the same time have suffered the severest destruction. You can count the dry beds of hundreds of rivulets and little streams,

once emerging from this lower mountain chain and giving fertility to the country below. I should think it would be possible to take up a single small valley, the sources of one of those outlying streamlets, and cultivate it intensely with trees, and if after a short time the rivulets become perennial, I should think that a basis for future operations has been obtained, overthrowing all other local considerations. I could give you more than one example of mountain streams becoming again perennial after the reproduction of destroyed forests. These forests in the lower hills are therefore to be our first consideration, and the indirect utility thereof must not be under-rated. In the Punjab we can see at the first glance that we have too little of this class of forest.

The forests in the plains have but a local climatical influence, and this is only beneficial in the case of a well-stocked plantations. The so-called rukhs in our province have not the same influence in the climate as cultivated land, and I would only preserve them where their direct utility commands me to do so, and otherwise always encourage their permanent cultivation. The area required is, of course, much easier ascertained than the area for the first class of forests, and there is no hurry about it.

The forests on the higher hills round the sources of our larger rivers are both of direct and indirect utility, and a study of destructive rain floods on these rivers and their tributaries is indispensable, to enable us to decide on the area we have to preserve. We do wrong, for instance, to preserve only deodar forests, because these are the only hill forests which give us a direct income; other forests serve as well as protection against the natural powers, and I must again remark that it is but rarely the cutting and legitimate use which has ruined and ruins the forests, but the wholesale destruction by fire and grazing, and I cannot help regarding it as sinful to defend the rights or privileges of a few semi-nomadic tribes—rights which interfere with the well-being of vast tracts of cultivated land, and necessitate innumerable irrigation works and other expenditure.

MR. MAX H. FERRAR sent the following paper, which was read:—

This question is inseparably bound together with the one just discussed, and, in my opinion, not an independent question, but an item of the larger one. This "of course*" strikes me as premature to say the

* *Vide* the heading of the subject.—ED.

least, and there is a desire to define what there is at present no object in defining, and so to tie our hands, and that in the dark. In making it an open question, how much land should be treated as forest, it does injustice to the accepted principle, that all non-arable fertile land is forest, and should be so treated, if not by special measures, at least by general laws. Then as to the tracts proposed to be included and requiring management, in some cases on highly, in others on less highly organized systems, I believe that much would remain undone, as well as much be done that was not to the point, if one aggregate *area* were apportioned *par excellence* for management at an outlay directly proportionate to the area, and, therefore, irrespective of peculiar requirements. I think there is a desire to solve, in a rough and ready way, a question which, to be safely met, requires the most detailed investigation throughout India. "The practical means at our disposal" are clearly *none*. The fact that we may obtain a general idea of the direction, does not warrant us in following it blindfold. The true basis to start from, in this as in every point of detail, is that laid down above. The attempt to make the short cut proposed can, if carried out, be only productive of half measures on a grand scale.

MR. B. POWELL.—The value of this paper is diminished by the assumptions it makes. The "short cut proposed,"—there is not a syllable about any short cut at all. The object of the question really is, to meet the difficulty of determining what amount of forest we ought to preserve. The general feeling abroad is that we may only take as conserved forest the small residue left after every body else has been satisfied, *i. e.*, after immense areas have been given up as "unreserve," that is to destruction.

Is this wise? that is the question, and the obvious purport of the discussion was to illicit views as to the collection of statistical data, and as to what I regard as the very great danger of our present system of selecting reserved forest.

In conclusion, I wish to append a few practical remarks.

First of all, it is always better to do nothing than to do the wrong thing. There need be no hurry to rush into action. A short time spent in rational deliberation would further our object more than all the random fits and starts have frustrated it. In other countries it has been found necessary to decentralize in the Forest Departments, in order to place a check on the idiosyncrasies of individuals. Without expecting the Government of India to depart from its traditions, the end might be attained to a considerable extent, by associating with the opinion of a central officer in all technical matters that of four or five others whose duty kept them in the same place. These others could be such forest officers as were available, supplemented by civil officers and commercial men.

But there is no point on which a practical conviction is so much needed, and where we find so small symptoms of such a conviction, as the fact, that our forests of to-day are an integral part of the forests of India

for ever. It may be objected that the degree of demand which I have above implied as the justification for active measures cannot arise till the forests have been closed. To this my reply is, that in the case of the better sorts they are virtually closed already; and for the rest, if the value of timber does not warrant expenditure, it as little warrants removal of produce. But, it will be said, if we set about raising prices by withholding the supply, we shall put money into our neighbours' pockets and oppress our own population. Far from it! a rise of prices, no matter where, is the making of the Forest Department; and it is about the opposite of oppression to withhold from the country that which, because within its grasp, it would rob itself of for all time. Many people, to judge by their practice at least, regard the forests as if they were *mines* of timber. They think it the good luck of this generation that the timber mines will last its day as the coal or tin mines. They ignore the fact that, while the most we could do would be to avert the evil day for a relatively short time in the case of mines, we can avert it for ever from the forests. Our consistent course would be to put ourselves on the short allowance we are cutting out for posterity, though by the act of doing so, we should widen the horizon of the future and admit ourselves to such full enjoyment of the forests as is rightfully our share. Not that we can say precisely what the normal produce is, in order to utilize precisely that quantity, but we do know it to be so small as to forbid the slightest waste. We are producers, *not dealers*. Produce means, time and money. Therefore, it is imperative on us to get the full value of every cubic foot. We cannot get that, it will be said, while timber is so plenty, and prices so low—fixed ideas. Timber is not plenty, devastation is rife, if you like. If we withheld our capital from the market, the price of timber would adjust itself in even proportion over the whole revolution or cycle of tree-life, and would command the funds required for the fullest and truest preservation of the forests. Therefore, at least stop waste. People who have been paying for the privilege of being allowed to make salt for themselves, can afford to pay for getting timber made for them. It would not be a greater hardship for them to pay for the wood they burn to boil down the brine, than to pay for the sea-water evaporated in the process. If the salt revenue subsists to the exclusion of the timber revenue, I think I am not presuming on my province in saying that it should nevertheless be put to the credit of our department, for it is we who furnish the most valuable article used in the manufacture. All consumers of timber must stir a hand to help to produce it. People would then become accustomed to see in the forests that were withheld from havoc the fruitful resource instead of the dead magazine. The supply should be made from the outset essentially as long lived as the demand. Instead of, as now, having a decreasing revenue, or being threatened with it owing to inability to keep up the havoc for an overstocked market, we might actually withdraw the gross mass of produce without loss; for in India, unlike Europe, competition could be neutralized, while the continual advance of the high elastic demand would steadily raise the prices, so that we might even realize the dream of the Financial Department, and start with a respectable and constantly increasing revenue. I am far from saying that capital drawn from other sources should not be sunk, in order to create fruitful and

independent forest capital, when it appears that the speculation is a positively paying one. What I mean to say is, that before going that length, we should see if we have not *bonâ fide* forest resources lying idle that might first be realized. Who would take shares in a new company, and throw away those he had in the old, without an attempt to realize something from them. Every stick that people are allowed to have for simply nothing, without payment, even in the shape of tax or permit, is a case in point. Our position as the youngest of civilized states in erecting a forest administration points to the privilege and duty of using the experience of those who went before. We are on the high road towards forgetting this, and are proceeding to gain our own knowledge by sad experience. A wide field is open for enlightened statesmanship in the rôle the forests of India are made to play. The vastness and the unity of the empire provides singular advantage for action untrammelled by external influences. Our system of government is the best suited for protecting the interests of the community against the selfishness of its transient components. The plea cannot be urged here than what is everybody's concern is nobody's concern. We have a paternal administration, caring for everything, responsible for everything, entirely disinterested.

Sound forest administration is *the* sphere for disinterested policy.

MR. B. POWELL.—I wish I could agree altogether with Mr. Ferrars, because his views are evidently in the main right, only he stops short of telling us practically what we have to do to go on the right track. In the first place, the question proposes, that we want to arrive at a knowledge of the area to be kept as forest; that if we know that, of course we shall have a basis to go on. Mr. Ferrars says, this "of course," is premature, but surely it *is* a matter of course, that we cannot say what we ought to spend on establishments, &c., unless we know whether our forest area is sufficient, insufficient, or superabundant? He says, that we want to define what there is no object in defining, and that, too, in the dark. This is hardly a fair criticism, for the very question assumes that we are *not* to do it in the dark, but it asks virtually how are we to get light to see to do properly what we must do. I cannot admit that there is "no object in defining."

Mr. Ferrars says, and truly, that it is an accepted principle that all non-arable but fertile land should be kept as forest; but at present in Burma, and all over India, forest occupies an enormous area of land that *is arable*, and people are perpetually wanting, and increasingly so, day by day, to cut down the forest and clear the land: "toungyá" cutters cry for land in the very centre of our teak lands of Burma. Tea planters demand land on slopes in Sikkim, and Assam, and Cachar, and we allow this clearing to be done here and there,

without knowing why or on what principle we allow it. The question aims at investigating the subject and letting us know, how we are to organize the system of granting away and retaining forest lands. I cannot admit that the 'practical means at our disposal are none.' I say, if instead of working out timber that does not pay, and spending our time girdling and fighting the Public Works Department, and preparing immense daily labor vouchers, we were steadily and soberly to set ourselves to find out what the forest lands at the disposal of the State were in extent and contents, what the export demand was, and what the local consumption was, and what land it would be safe to give up for cultivation, we should be doing what no one can deny to be the right thing. There need be no hurry to rush into action, Mr. Ferrars says; well; but the action that I do wish to rush into, full force, is to collect statistics and ascertain data; to stop working forests, whose yielding power we have no idea of; to stop making plantations without knowing whether they are wanted or not; and to devote our strength to finding out *facts*. As far as Mr. Ferrars remarks about forest questions being settled by more heads than one, I cordially agree; and I have no doubt at a later period of this conference we shall have something definite to recommend on this subject.

MR. RIBBENTROP.—Mr. Ferrars should tell us exactly what he wants to do, to put a period to the whole present state of things, which appears to him to be certainly wrong in all respects.

MR. B. POWELL.—One thing has to be noted. Government should be extremely cautious in giving away land in the hills, especially before it knows whether it is required for forest purposes or not. In the plains the climatic effect is much less. I quite agree that the more of the "Rukhs," or scrub-producing fuel lands in the Punjab for instance, are given up to cultivation, the better.

MR. RIBBENTROP.—The cultivation of the waste lands in the plains is actually more beneficial in a climatic point of view than their maintenance as forest.

MR. McL. CAMPBELL.—When waste lands are given up, the forest officer should be consulted.

MR. B. POWELL.—But it is *the* question, can we reasonably require the land as forest or not? Take a big jungle

province like Burma, the old question comes back again, what is the proper area of forest to retain? Then you can tell whether this or that land can be given up. And the collection of data to enlighten us thus becomes our first work.

MR. LEEDS.—Still grants of waste lands should be made with caution; all sorts of grants were made in Burma. Along about 18 miles of the Prome road, for ¼ mile in breadth, a grant of land was made; another on the Irrawaddy, below Henzada, for 15 miles in extent, was made: this was found out and stopped.

MR. B. POWELL.—We need a better organization for forest enquiries than we have: we want to stop working in the dark, as we are doing at present. We make much of our classification of forests into "reserved" and "unreserved;" who knows whether the area of the one is sufficient so as to justify us in giving up the resources of the other to gradual destruction, which is the *practical* meaning of the term "unreserved" forests? We ought to be collecting data for knowing what forests we want for climatic purposes, and, above all, to know what the forests we have got can yield, for the supply of private wants and public works. At one time I saw a hope that this would be done; a separate branch was to be organized, which would enter *on all provinces simultaneously*. Instead of this an idea was started, that somehow or other the topographical survey of the forests was to be made, first of all, on such a scale of minute accuracy that other survey departments would accept our work and incorporate it with theirs. This idea received a most unfortunate prominence, totally incommensurate either with its practical or theoretical importance, and the whole work was reduced to a survey.

Of the beginning I say nothing. The survey of the Dera Doon was of tolerable, but only tolerably great, importance: still a beginning had to be made, and it was necessary to get hold of a staff of men and train them to survey. Dera Doon possessed great advantages in this respect, so that I have no objection to make, and I regard the present survey of Dehra Doon as useful beyond all criticism in this respect.

For *forest purposes*, an accurate delineation of the boundaries of the sâl forest, where it abuts on private grants in the Eastern and Western Doon, and a fairly accurate knowledge of its acreage, of the situation of the chief streams, and a delineation of the chief local features, are all we require.

The entire survey of the southern faces—that curious sea of sandstone peaks—is absolutely and totally useless for any purpose connected with forest conservancy; but as a training school for surveyors it is, of course, an admirable work. Still, assuming that the one survey staff will accomplish each of the provinces entirely in three years—truly a most sanguine estimate—and assuming them to take

North-Western Provinces,	Mysore and Coorg,
Punjab,	Assam,
Central Provinces,	Bengal,
Berar,	Oudh,
Ajmir,	Burma,

it will be 30 years at least before the last province gets surveyed; in other words, before the *first steps* can be taken to form the preliminary working plans, which will enable us to know what the area *we have* can yield, and stop our working in the present manner, spending money by guess work, cutting this, that, and the other with merely a vague and baseless belief that the forest will bear it.

It was found that a certain sum had been spent on surveys; it was at once concluded that they were worthless; so they were, some of them; but no inquiry was ever even thought of, to see how far the work had resulted in obtaining practically good maps—maps which would at least form the basis for a generally correct idea of working. And why fall foul of the survey expenditure? will it be seriously compared to the expenditure on plantations, where the water had to run the wrong way—to timber works, that did not pay, and to many other financial excesses that our history will show? But no, the camel was swallowed and the gnat strained at.

DR. SCHLICH.—The special "survey and working plan branch" is certainly objectionable in its present constitution. To create such a branch and set it to work in one province, and condemn all others to inactivity for an indefinite period, can surely not be seriously contemplated. The Conference should represent this strongly. I therefore propose the following:—

RESOLUTION.—That a 'survey and working plan' staff should be organized in each province, such staff working under the superintendence of the head of the branch through the Conservator of Forests. That one of the chief duties of the staff should be to collect the necessary statistical data for

guiding our work *at once* and in a systematic manner, on a plan to be laid down strictly.

That this Conference considers that too much stress is laid on the work of survey as against the work of collecting facts—or data on which to make such preliminary plans of work as will enable us to deal with our forests otherwise than at present on the merest guess work.

That in many parts of India maps exist quite accurate enough for a considerable time to come, and all we require to do is, to lay down accurately the boundaries of the forests where this has not already been done.

Further, that although it has been concluded that all the money hitherto spent in surveys has been wasted, it does not appear that an inquiry has been instituted with a view of ascertaining how far this conclusion is substantiated, and the Conference therefore recommend such an inquiry as will show the true position of each province as regards its maps, and further that the systematic collection of data on an uniform system be forthwith commenced.

MR. A. E. WILD.—I am glad to second this resolution. In my opinion it is essential that the collection of data for working plans should commence in each province simultaneously; without this it is impossible to work on any system to know what our financial position is. In working plans, I include the survey where necessary, and the ascertainment of facts and statistical data. At present we do not even know our resources, and in case we are asked to supply any extraordinary demand, we could not certainly say whether we could supply it.

Agreed—*Nem con.*

SUBJECT V.

SETTLEMENT OF FOREST RIGHTS AND PRIVILEGES.

The following paper by Major Kenneth Mackenzie was then read :—

"On the principles on which a settlement should be effected in demarcating forests with villagers who have enjoyed the general run of the forests with undefined rights."

In forest conservancy, as in other lines of action, our aim is success, and those principles will obviously best suit us that promise this end. But in forest matters particularly, success, either absolute or in degree, depends on the extent to which the minimum demands of forestry are reconcileable with the maximum of the genius of the particular people to be dealt with, that is, the extent to which their habits and prejudices can be consulted. Habits and prejudices, however, are usually, though not in all directions, very much regulated by the purse. Hence in making our arrangements, the non-touching of the people's private purse, as far as can be, should be our chief care; for with all ranks and grades, the most civilized as well as the most backward, this is really the ultimate test or standard to which all measures of Government are referred; and the more ignorant and unreasoning people are, as wild woodsmen, and especially Indian woodsmen may be expected to be, the more galling will all departure from this standard be. Now, most people, situated as those in the proposition before us, will be found to depend for existence partly on agriculture, however rudely practised, and partly on certain specific products, the natural yield of the forests. Moreover, this forest produce will probably be used in two directions, in home consumption and for export; while obviously the value of their export trade will depend on the position and accessibility of the markets where the demand for such produce concentrates, and to the extent to which their forests are the *sole* sources of supply to meet this demand. This being so, the people that we are supposed to be about to deal with, will practically be unharassed—the great point to gain—if our principles of settlement recognize—

1st.—Absolute non-interference with their agricultural holdings and habits; where these latter are not directly inimical to the minimum necessities of forestry.

2ndly.—Absolute freedom in ability to supply their *home* wants from the forests.

3rdly.—Definition of the areas of conservancy between what are technically designated as State and district reserves, so regulating work in the former, and unrestricted fellings in the latter, on principles of rotation, as to ensure such regular supply of produce for export that its return (calculated on the rise in the value of timber that usually must follow on restriction) shall approximately average the people's earnings when the run of the entire forest was free to them.

4thly.—Collection of royalties or dues on exports from purchasers and not from the exporting woodsmen. [To save the known general timidity of forest villagers, the less they are subjected to demands of any kind the better.]

Subsidiary to these four cardinal points, as I would put them, I would add one minor one—

Carefully to concede some privileges to those inhabitants living within State reserve limits, not held by those living without, in order to compensate the former, and reconcile them to the greater strictness that must necessarily prevail in the State areas, as compared with those known as district reserves.

My proposal under the third head may at first seem somewhat impracticable, but it will be recognized—dependent, of course, on the demand and the sources of supply open to the markets,—that restriction of felling areas, by limiting the quantity of forest-produce available for export, usually too of particular kinds, not only will raise the value of such, but will bring probably into consideration and demand hitherto neglected sources of gain, resulting practically, if the happy mean has been hit off, in as much revenue to exporters as when the entire areas were open to be drawn upon.

In addressing a body of Forest Officers, all of more or less experience, it is not necessary for me, it seems, further to enlarge on the points I have urged, for I think it must be apparent that a strict attendance to them, *if feasible*, will pave the road to the most prosperous results. I say advisedly if feasible, for the degree of success to be commanded depends on a variety of considerations usually largely beyond control, to detail which would not only be uselessly tedious, but would necessitate an intimate and lengthy review of the diverse circumstances that face us in India, not only in different provinces, but often in different parts of one and the same province. Indeed, the circumstances of each province must separately determine, and this may vary in each, the point beyond which forest conservancy to fulfil its ends can make no concession. With this line drawn and kept steadily in view, the problem is to introduce the necessary, that is, if it is to be introduced at all, as much in harmony as possible with the considerations I have sketched.

No hard and fast line of detailed procedure can, in my opinion, be safely laid down for Indian forestry applicable to all parts. We must bend, or be bent by circumstances, subject to no retreat beyond the line of possible concession, and this calls, in Forest Officers, for the display of endless and unwearying tact. Moreover, when a more or less successful line of procedure has been struck, there must ever be a readiness to shift the anchors, to give rope if need be, so that the ship may swing and keep in position with the shiftings of the tide, remembering that the waters are seldom long calm among the races in contact with whom it is our destiny often to attempt to solve the problem propounded.

MR. B. POWELL.—As long as the real requirements of the *forest* are kept in mind, and "no retreat beyond the line of possible concession allowed," I quite agree. The maintenance of the forest demands that nothing more than the

interest should be taken from it, and that the capital should be not touched; to do that he must know what is the highest possible yield, and what measures, simply passive—of conservancy and giving repose—or active—of natural reproduction and artificial planting—are necessary to keep up the yield. These being never transgressed, everything else may be shifted as you please. You may grant everything free if you like, only consider the value of what you give and don't call for a cash revenue in *addition* to the unrealized revenue that you forego by your free grants. Let your people know the line beyond which you will not go and trust you to give them every indulgence within. In the Mailghât there has been an endless shifting and vacillating in past days for want of determining the line and sticking to it. I hope that is at an end now. They listened to every outcry and rather encouraged outcries. Now what I should like to impress on the Berar authorities is this: There are two kinds of outcries,—one the outcry of real distress that has to be relieved, and I believe *always can*, the other is the mere outcry of interest. No one likes conservancy; it must, however fairly applied, curtail some one's old practices to which he is attached; for instance, some Kurkus, I think, made an outcry to the Resident when he visited the place. They stated, says Major Mackenzie, no real grievance, but asked to be allowed to cut, burn, &c., everywhere as of old, that is, adds Major Mackenzie, they asked that it should be made impossible that forest should either exist or be created. If you let people think that they can induce you to give in, they will cry out, and the very vigilance that is supposed to arise out of great consideration for the people, fosters, if it does not actually cause, the outcry.

MR. DRYSDALE.—Major Mackenzie means that when restrictions are imposed on villagers we should be ready to give in, if experience shows that such restrictions are not absolutely needed.

DR. SCHLICH.—I agree with Mr. B. Powell. No plan of treatment and working must be laid down so hard and fast that it cannot change; but provision should be made for regular periodical revisions, Forest Officers and Civil Officers going into council about the revision; but changes cannot be made at less hazard, consequent on the opinion of any official who happens to go into the forest and thinks he has discovered a grievance.

MR. CAMPBELL.—He wishes to give in to people in district forests, not in others.

DR. SCHLICH.—I object radically to the theory of "reserved" and "unreserved" forests, *viz.*, that one lot may be preserved and the other hacked about anyhow.

The reserved forests usually form a small area, quite out of proportion to the wants of the country; and if the unreserved forests are not also worked on a plan, they will be destroyed, and the little reserved areas that are left will be insufficient to stave off great and general inconvenience.

MR. B. POWELL.—Major Mackenzie qualifies the "unreserved forest" idea by saying that he wants it worked in rotations; here he is quite right.

MR. DRYSDALE.—I will afterwards give a memorandum on the Mailghât system, which may be interesting. The "unreserved" forest *is there* worked on conservancy principles.

MR. B. POWELL.—In that respect, as regards the principle, the "unreserved forests" of Berar are better off thus elsewhere; but I am not quite satisfied that *all* the necessities of the case are really met by the system in force.

The difference between "unreserved" and "reserved" should rather be one of income than of treatment. In the reserved, you keep all the income for the State, in the other you allow the material to go to supply people's wants; in other words, you give away the income; that is quite right as long as the financial authorities *remember the fact*, and don't try to eat or give away the cake and have it at the same time. But in either case, you *have no right to let the forest be destroyed or to take out of it more than the interest of its capital*, and you must find out what the interest is and what steps are needed to keep up the steady yield.

I offer these remarks with much diffidence to an assembly so well qualified to be critical. Such as they are, they come from observation of the practical results obtained by the Forest Department in that province—the Hyderabad Assigned Districts, commonly called Berar—where in a civil capacity, I myself have the honor of serving,—results which are, I believe, allowed to have been attended with some measure of success. Whether I have correctly generalized the guiding principles that there ruled you can easily judge by reference to the reports of the Resident of Hyderabad (Mr. C. B. Saunders) and those of the successive Deputy Conservators of Berar. It must be admitted, however, that in making its advance in Berar, the Forest Department was largely favored

by fortune, and its history there well illustrates how much, in all matters of arrangement, we are, as I have said, the creatures of circumstance. It was fortunate at its start to find in the high lands of the Satpoorahs—a remnant of forest worth conserving, fairly capable of supplying annually all local wants; while to the remunerative markets close to the scene of its operations—the territory it annexed happened practically to be the *sole* source of supply. Then came the American War, forcing at high pressure the demand for cotton, and leading to extraordinary clearances in the plains of Berar—where the land bountifully suited the much-coveted staple—which served the Forest Department in two directions at once, first, by removing in the clearances such little rivalry as had existed; and, secondly, by giving an impetus to the wood-trade in all it branches, consequent on the demands that arose and followed the great and sudden enrichment of the people of the plains. In this state of things the Department opportunely seized the occasion to define their areas on the principles I have indicated, which enabled considerable restrictions over felling areas to be introduced without practical pressure on the people affected. Since from the smaller areas annually left for their use, it was open to the people to realize, at enhanced rates on the favourite exports, and on the coming into value of articles previously valueless, a revenue commensurate with, if not beyond, that which they had been accustomed to enjoy—when all the forest was open to do with as their hearts pleased. And so it came about that the general arrangements made fortunately carried the people affected contentedly along—without which no measures of conservancy, I contend, can ever hope permanently to take root and succeed. The art is,—without sacrificing the essentials of forestry, to discover and apply the way of so carrying the people, under circumstances the most diverse, and often the most adverse and discouraging possible.

MR. B. POWELL.—I must say that after hearing this paper, I feel great regret that Captain Mackenzie is not here himself, because there are so many points in which his personal explanations would have still further elucidated the subject, and I think he would have said more than he has. I wish I could read to you a letter he wrote last year about the settlement of the interests of forest tribes and local residents in the Mailghât forests.

Here he bears out fully the principle in all such settlements, which is what I ask the Conference to support, *viz.*, that having once made a careful settlement, determined what forest we are going to reserve, and how we are going to treat it, let us stick gently, but firmly, to what the Government have sanctioned, and never mind what people say.

In the first place, let the interests of the *people* be fully represented by an intelligent, reasonable, and experienced civil officer of the district or settlement staff, and let *justice*, full and fair, be done to everybody, in the adjustment of

rights and concession of privileges. Having made that settlement, let the people understand that in other respects the Government is determined to maintain the conservancy of the forests, and that, in the words of General Lake, one of the wisest friend, the natives of the country ever had,—"in spite of all clamours."

You never did invent, nor ever will invent, any system of conservancy, worth the name, which was popular, or which everybody liked.

Forest conservancy is as much hated in Europe after three centuries of practice, as it ever was; and if so, how can you expect it to be *liked* in India? Whatever you do, you affect *some* one; you limit the freedom of some people in their grazing, burning and cutting, and they hate it accordingly.

To suppose, therefore, that you can carry with you the people in the effort to conserve, is a vain hope.

But, though you can't be popular and please everybody, you can and must be *just*. See that every one is either provided for, or fairly paid and compensated, and then stick to your arrangements.

Here, of course, the tact and discretion of the officer in charge of the forests will be called into play: he must maintain the system, but he must do these things;—

(1). At first he must not be too strict in preventing every trespass; he must be content to let off people who confess ignorance, &c., with a reprimand, and only punish the real trespassers and obstinate people or really bad characters, whose punishment the rude sense of justice of the people, will acquiesce in.

(2). He must take care of his subordinates that they do not vex the people, by making it difficult for them to exercise the settled rights and privileges that are permitted. He must also be very accessible to the people, and lose no opportunity of talking in a friendly way with the more reasonable among the people, so as to explain, within their comprehension, what the object of forest conservancy is: and try, in fact, to make himself the friend of the people, not their enemy.

(3). He should have full authority to give out rewards and presents to neighbouring villages, &c., who have given ready help in extinguishing fires, in stopping forest offences, or who have shown forethought in planting trees on their own account, &c.

(4). He should endeavour to use the services of the people in the vicinity, getting all his forest work done by people who will gradually look upon forest work as a fixed occupation. He might endeavor to get the neighbours to take up his smaller contracts, so as to make the maintenance of the forests a matter of pecuniary interest and personal pride, if I may go so far,—to the villages near at hand. I don't mean to say, of course, that all these things can be done all at once, just as they are put down on paper, but I do mean to say that a good deal can be done *in this direction*. But I shall make no apology for repeating here what I may have urged in the course of the discussion of the papers; that it is a totally false idea to imagine that you are doing right, by taking up certain small "reserves" and leaving all the "unreserve" to itself, to supply the people without rotation of area, without rest, without selection of trees or areas to be cut on principle, without precautions to secure coppicing.

All the forest should be worked on this general principle, that you are to *take the interest but not trench on capital;* and my complaint is that most of our "unreserved" forest management simply ignores this altogether: it provides, indeed, for paying fees on the produce and nothing more.

Of course, if you are *certain* that you have a vastly larger area of jungle than you want, it does not matter; make the most of it and let the land go; but you don't know that we have yet no *data*. Therefore, you must treat *all* forest rationally until you have. And there is at least the indication, that where you see certain forests burdened by a very large demand, you may be pretty sure that they must always be kept as forest, and it is those places that require attention.

At present our system (except to some extent in the Berars) and notably so in the Central Provinces, is to keep a small area for conservancy, the extent of which is probably totally inadequate, and call the rest "unreserved," which practically means forest given up to slow but certain destruction without any conservancy, and only get for it a little revenue or a large revenue, according to the amount of free rights it is considered expedient to allow.

MR. McL. CAMPBELL.—In the unreserved forests in the Tanna District, Bombay, the 16 best kinds of trees are reserved and cannot be cut except by the Forest Depart-

ment or under their orders. I do not, therefore, think that with regard to these forests to make a tract "unreserved forests" is to give it up to destruction. But it is, I admit, to give it up to deterioration as a source of inferior supplies; and to prevent this deterioration I think that portions of the unreserved forest should be shut up in rotation, and cutting in the open passes only allowed under control.

MR. B. POWELL.—Call it "deterioration" or call it "destruction", I do not think there is much to choose. What I want to point out is that we have got to get *data*, and not to go on "fixed ideas." We have no right to sit down in a complacent frame of mind, as if our classification of "reserved" and "unreserved," (the latter being given up to unrestricted felling without any precaution for reproduction) was a satisfactory and final solution. You reserve 16 kinds of trees, good; are they permanent; is there such a stock of young trees coming in that you will be sure to have new ones to replace those you cut? Is the rest of the forest not destroyed, and how will your 16 kinds fare if everything else, but these; are destroyed? Mere reservation of species will not save a forest.

But I meant to confine this note to dealing with one specific point, and to this I will confine myself. The principle is correctly stated; "the minimum requirements of forestry" is to be the line beyond which retreat is impossible.

You need not in short put your *whole* forest under such *intense* treatment as to necessitate a total negation of all privileges, all conveniences whatever. It may be necessary to do this in some forests on account of their value, actual or prospective. But in others your object is to have an abundant supply of medium-sized timber and firewood and other minor products which are in demand among the large agricultural population you have to supply. A very *intense* cultivation is not necessary. But there is *a* degree of care and protective treatment which is essential to keep the forest always yielding the same, if not an increasing, outturn. If you do not give *that* degree of care and insist on that amount of protection and rest, your outturn will surely fall off, *and in a few years your people will be worse off* than ever they would have been by reason of restrictive measures, because the forest that yielded their means of livelihood and the supply of their wants, will *disappear!*

The anti-forest officials—there are a few of these people in the Punjab and elsewhere still existing—do not believe

this; at the bottom of their hearts, they believe that the forests are inexhaustible, and hence they look coldly on all conservancy; they will not admit this, but they *do all the same*.

Now, it is the degree of care and the sort of treatment necessary to maintain the district forest in the state of permanent yield that is the "minimum" spoken of by Major Mackenzie.

Then some objector will say what is the minimum? it will differ in the opinions of different people. One forest officer will have what are called liberal or broad views, and another not so.

I answer that the objection is nonsense, pure and simple, but very natural nonsense, because it is made in equally natural ignorance of forestry. In the first place it is not the fact that any such difference could arise, because such matters are not settled by "views" like political questions, but are dependent on facts: given the facts and the *necessities* of treatment follow. Foresters might differ as to details: one might think that one system of felling is better than another; one might say I would treat the forest by clear cutting with artificial reproduction; another might require the natural reproduction system, and so on; but the fact of the yielding power being given, and the rate of growth, &c., being all established as factors, all questions would be at once settled as to the material that could be got out. Besides, if there is a difference, you can easily put a stop to the difficulty by satisfying yourself on the subject, and referring the plan laid down to critical examination by the best authorities available. You must set about collecting the *data necessary*, and then you must draw up a simple working plan in consultation with the district officers. You must determine what people, houses, villages, or cattle you have got to provide for, and each must have its material which may be accumulated, but *not* exceeded.

This plan when revised and sanctioned, indicates the "minimum line." Prescribe that authoritatively, and provide for *periodical* and *regular* but not haphazard and idiosyncratic alterations and revisions; and I wish to see *all* other matters guided by the *Civil* Officers.

The systems of Madras and Bombay do not show any better results than those of the Indian system, *because* this one cardinal want is left unsatisfied.

No body knows for the *district* forests—

(*a*).—Who is to be supplied?

(*b*).—With how much of each kind?

(*c*).—Free or by purchase? (settlement of rights).

(*d*).—Where from?

(*e*).—How much is there on the land now?

(*f*).—How long does it take for the material to be produced?

(*g*).—What are you to do to get the material if it is not already on the ground?

(*h*).—If it is, how are you to treat the place to make it *always* be there?

These and such like questions must be determined professionally. At present the Collectors don't of course know how to do it, and their assistants don't, at least in Madras.* And if they do, they want to be guided by directing heads on a *uniform and steady principle*, or they can't work.

How can you expect a young trained assistant to walk up to his Collector and say—Our forests are all wrong, or at least we have not the least ground to know whether they are right or wrong; let me set to work and collect the data, lay them before you, and don't spend any more money till you know what you are about? The Collector would stare: Yet by the present system you can attain nothing *but a certain income from permits and passes and nâka houses;* you are working in the dark, and you *don't know* whether you have a right to cut a stick of what you are cutting.

MR. DRYSDALE.—In the unreserved forests of Berar, with the exception of those of the Mailghât, which have been placed under special treatment, thirteen descriptions of trees have been set apart as reserved, and these are not allowed to be felled except with the permission of the Deputy Commissioner of the district in which the forests are situated, or of such of his subordinates as may be authorized by him to grant permission. The remaining kinds of trees—which, it may be noted, are of little value, except for fuel—are placed in charge of the patels or headmen of villages, who have authority to permit the trees to be felled as well as to collect duty on them.

* There are, I know, a few men in Madras who know something about forests, and who will not resent an honest expression of opinion which they will probably admit to be, to some extent at any rate, just. It is difficult, I own, to speak confidently about this *terra incognita* of forest administration with its reports two years late (as a rule), and which might as well be written in hieroglyphics for all the information they contain!

In the keeping of forest accounts, the patels are assisted by the patwarees, and both men are allowed a percentage on the revenue they collect.

The District Forest Establishment is employed in moving about the district, and seeing that the rules are everywhere observed.

Arrangements are now about to be made for grouping villages together, and working their forests on a short rotation, so as to admit of more effectual steps being taken for the conservancy and improvement of the forests than has hitherto been possible.

The system of working the unreserved forests of the Mailghât is described in the accompanying memorandum.

With few exceptions, the forests in Berar are the sole property of the State. No private rights exist in them, although certain privileges, consistent with the conservancy of the forests, are allowed to their inhabitants.

The settlement in Berar being a ryotwary or field settlement, no cultivator possesses any rights outside the land he cultivates.

Memorandum on the Unreserved Forests of the Mailghât with a scheme for their future management.

The Mailghât forests situated to the north of the Ellichpoor District, may be said to occupy an area of about 1,500 square miles.

2. Of this 400 square miles have been taken up for the Byraghur State Reserve, leaving an area of 1,100 square miles which constitutes the unreserved portion of the Mailghât.

3. It is from this area, that the wants of the greater part of the Poorna Valley, as regards general forest produce, are supplied.

4. The forest produce is exported by the hill tribes to certain wood bazars established at the foot of the hills, where it is bought up by the people of the plains, from whom duty is collected by the Forest Department.

5. Till the end of May 1871, no restriction whatever was placed on the felling of timber in the unreserved forests, and as a natural consequence, only the very best varieties were cut for exportation. In fact, the felling was almost entirely limited to teak. That the continuance of this system would ultimately cause the destruction of the forests was noticed as far back as 1867 by Major Pearson, who, in paragraph 8 of his letter No. 57, dated 12th July, to the address of the 1st Assistant Resident, remarks: "but nevertheless, the present system of allowing the timber-sellers to fell and cut teak wherever they like, subject only to the payment of a tax, will very soon ruin the forests, if it is not put a stop to," and further on in the same letter he recommends that "the forests should be worked on what may be called the coppice system. To this end the whole area should be divided off into six portions, and

the felling of wood for export should be strictly confined to one of these for two years; all the other five portions being shut up. Each portion should then be worked for two years in succession, which would give a rotation of 12 years, in which period, from what I have seen, I believe the teak will attain sufficient size to meet the wants of the people, which is chiefly for poles and small rafters."

6. Major Pearson, however, proposed that no action should be decided upon in this matter till the opinion of the Inspector General* had been taken.

* Dr. Brandis.

7. A reference was then made to the Inspector General, who fully approved of the recommendations made by Major Pearson, and further suggested the appointment of special Forest Officers, to whom should be entrusted the carrying out of the proposals for working the unreserved portion of the Mailghât, as well as the selection and care of other forests in Berar.

8. Special Forest Officers were appointed in 1868-69, and steps were being taken to give effect to the above proposals, when the Inspector General, in the beginning of March visited the province himself, and after examining a part of the Mailghât reported that rather than introduce a system of rotation into the unreserved area, he considered it preferable to leave existing arrangements unchanged for the present, as he was of opinion that by the time the teak in the open forests had become exhausted, the reserves would be in a sufficiently prosperous condition to meet the wants of the country. Meanwhile, he suggested that the system of unrestricted cutting should be maintained.

9. Thus matters rested till the beginning of 1871, when Captain Douglas, on inspecting the Mailghât Nakahs, found that owing to large teak being no longer obtainable from the open forests, exporters were bringing to the bazars nothing but saplings varying from 2 to 9 inches in diameter. He then drew the attention of the Resident to the necessarily exhausted state of the forests, and obtained his sanction to the immediate prohibition of the felling of the following varieties of trees:—

Teak, (*Tectona grandis*).
Tewus, (*Dalbergia oojeinensis*).
Sheshum, (*Dalbergia latifolia*).

10. This prohibition did not receive full force till the commencement of June, when the trade in timber had ceased for the rains. Its effect, therefore, on the public was not clearly observable till the commencement of the cold weather, when the trade re-opened. There was then a simultaneous outcry from the people of the hills and those of the plains, and numerous applications for the withdrawal of the prohibition were received both by myself and the civil authorities. The Kurkus complained that it did not pay them to export other varieties of wood, as thereby they only realized about half the profits that they used to derive from teak.

The Koonbees,† on the other hand, urged that other varieties of wood were of little or no value, and that they could not afford to build better houses, if they were obliged to use timber that would have to be renewed every two or three years.

† Ryots of the plains.

11. There was some shade of truth in both arguments. The profits realized by the Kurkus were, as was only natural, less than they were formerly accustomed to make; also other varieties of wood could not be expected to last so long as teak, although there is perhaps little doubt that they would prove as durable as the houses for which they were intended, and if well matured probably equally as lasting as the saplings hitherto used.

12. To alleviate the distress of the Kurkus, and to provide work for such as did not consider the exportation of the less valuable woods sufficiently profitable, I at once commenced coppicing the badly grown teak in a portion of the Byraghur Reserve, and at the same time started the extensive plantation works for which so liberal a grant was made in the Budget for 1872-73.

13. Meanwhile, the people of the plains finding that more limited supplies of wood were being brought to the bazars, were induced to offer better prices, and from the fair revenue we are now receiving, it may reasonably be anticipated that they have begun to find the other varieties of wood far more valuable and durable than they at first fancied.

14. A scheme for the working of the three reserved descriptions of trees mentioned in paragraph 9 now remains to be introduced.

15. I have just completed a minute inspection of the open portion of the Mailghât, and can fully endorse all that Captain Douglas wrote after his examination of the Nakahs and the timber there offered for sale.

16. Teak is more plentiful in some portions of the forests than in others, but with few exceptions there is hardly a tree to be found that would yield a "gole" 12 feet long by 18 inches in circumference. Everywhere this description of wood has been cut down, and from the system of felling hitherto in force, the trees, as a rule, consist of nothing but short stems of average thickness with numerous branches spreading in all directions.

The latter comprise the saplings that used to be taken to the bazars; the stems from 4 to 6 feet long, the distance from the ground at which the trees had originally been cut over, remained untouched.

17. To bring these trees therefore into a healthy condition, and to introduce a natural growth, the only course left open is to coppice them level, or at most 3 inches above the ground, and as I consider that 15 years will be required to produce the poles, rafters, and small wood, which form the chief want of the people of the plains, I propose that this be the period of rotation adopted for the working of the forests.

18. It being desirable that as little time as possible should be lost in the cutting over of the teak, and the yield of the forests during the first period of rotation being likely to prove more limited than in subsequent periods, I would suggest that as a commencement, the whole area be divided into 15 blocks, one of which would be opened annually. Afterwards when the teak had assumed a healthy form, and increased in quantity, it would be advisable to divide the forests into two or perhaps more large blocks, and again to sub-divide each of these into compartments according to the rotation, so that in each block one compartment would be opened annually, and thus the requirements of the people in

the different parts of the Mailghât and the plains supplied with the least possible delay or trouble.

19. The compartments would be selected according to their productive power, and consequently they would not necessarily be of equal area.

20. In demarcating them natural boundaries, such as roads, rivers, nullahs, cliffs, &c., &c., would be utilized to the utmost extent, and where these were not obtainable, I would recommend that all trees falling in the direct line of boundary be encircled with a broad ring of red anti-corrosive paint——a description of paint which is particularly cheap, and which is expressly manufactured for use in exposed situations.

21. Red, too, being the colour with which the Kurkus besmear their gods; the boundary trees would be held in great respect, and there would be little fear of their being cut or in any way injured.

22. This system of demarcation will cost little, and will at the same time, I believe, prove thoroughly effective. It also possesses three great advantages :—

1*st.*—The paint will be distinctly observable, and will in no way damage the trees.

2*nd.*—The paint can be readily renewed when required.

3*rd.*—The liability to create confusion in altering boundaries, which almost every other system would involve, will be entirely avoided, and that the boundaries hereafter may require to be revised is by no means unlikely.

23. The successful working of a system such as I now advocate, would necessitate these forests being placed under a stricter conservancy than has hitherto obtained. Neither dhyas nor collecting of teak leaves, nor irregular cutting, could be allowed in any block after the teak had once been coppiced. Such restrictions, however, would hardly be felt, as they would only be gradually introduced over the whole area of the open forests in a period of 15 years. Further, it would be necessary during the first two years to take special measures in each block for the keeping down of fires, and exclusion from grazing of all cattle belonging to villages other than those situated within the block.

24. I limit the period to two years on account of the expense, and in the hope that during this time, the people would themselves see the necessity of such measures, and would gradually become interested in the care and protection of the forests adjoining their villages.

25. For the cutting of the teak and other reserved trees, the following are the arrangements I would propose. In the block that was being worked, I would have a small protective establishment, whose duty it would be to see that the teak and other trees were cut in the manner prescribed, and that after they were felled the stumps were left as clean as possible, so as to prevent the lodgment of water, and their consequent liability to decay.

26. This establishment would require to guard against the felling of all trees growing on the tops and ridges of hills. These would have to be left as standards for seed to assist in the reproduction of the forests.

27. With a view to the successful introduction of these arrangements, I would make it imperative upon every one wishing to cut wood

to take out passes beforehand from some member of the establishment for the number of "krass," or other loads required. On taking out the passes which would be granted free of charge, the rules regarding the felling of wood would be explained to every one personally.

28. These passes would serve as a check against wood being cut anywhere outside the open block, as they would afterwards be delivered to the *carkoon* in charge of the bazar, where the wood was taken for sale.

They would further afford most valuable data as to the annual yield of the forests.

29. The protective establishment would also be able to guard against fires entering or breaking out in the block during the first year. In the succeeding year, however, a special temporary establishment would be required for this purpose for 5 months, *viz.*, from January to May inclusive.

30. The following is the strength and cost of the establishments I would recommend being entertained :—

Permanent Establishment.	Rs.	*Temporary fire preventive Establishment.*
1 Forester ...	35 per mensem.	
1 1st Class Forest Guard	15 per mensem.	5 Guards, at Rs. 8 each per mensem, Rs. 40.
1 2nd ditto ...	12 per mensem.	
1 3rd ditto ...	8 per mensem.	
Total	Rs. 70 per mensem.	

31. The permanent establishment would thus cost Rs. 840 annually, and the fire establishment Rs. 200, total Rs. 1,040 per annum, for which increase of expenditure funds are available from the budget for the ensuing year. No further grant would, therefore, require to be applied for.

32. The above proposals have reference solely to the three reserved varieties of wood already mentioned, *viz.* :—

Teak, (*Tectona grandis*).
Tewus, (*Dalbergia oojeinensis*).
Sheshum, (*Dalbergia latifolia*).

33. I do not consider it necessary to make any special arrangements regarding the other varieties of timber, of which there is a sufficient supply to meet any demand that is ever likely to arise.

34. Further Rule XXXII of the Supplementary Forest Rules, which provides that every tree be cut within at least one foot of the ground, will be a safeguard against these trees ever assuming the unnatural growth now common to the teak. I would, therefore, allow unrestricted cutting of the unreserved woods to continue as hitherto throughout the entire area of the forests.

MR. B. POWELL.—I rather fear this part: why not gradually close *altogether* certain tracts, perhaps smaller ones? It is, observe, based on a *belief* not on *data*, that the unreserved stock reproduces itself without care.

35. I regret that I cannot furnish along with this memorandum a map showing the several blocks into which I would recommend the forests being divided. The maps we at present possess are on too small a scale to admit of this, but I am now in communication with the Surveyor General for the preparation of maps on scales of 1 inch and 4 inches respectively to the mile, and as soon as these have been received, I shall draw up a plan for submission to the Resident. This will, however, take some little time, as in the marking off of blocks, a variety of subjects have to be considered, and it may perhaps even be necessary to make another personal inspection of the whole or parts of the forests.

36. Meanwhile, there is nothing to prevent the immediate introduction of the scheme, as no great harm will be done, if the provisional assignments for the first few years are somewhat too large or too small.

37. If this scheme be introduced, there will no longer be any necessity for forming the Kutkalee Forests into a State Reserve.

The teak there has already been felled, and if this block were ever required to be reserved, it could hardly be in a worse condition for taking over than it is now. Besides, the size of the Byraghur Reserve has already been increased to 400 square miles, which is the area. Dr. Brandis considered necessary to provide for the requirements of the greater part of the Poorna Valley.

Further, the exhausted state of the open forests has clearly proved that their area cannot well bear reduction at present. In fact, for some years it will be necessary to supplement the yield of each block of the open forests by teak cut in the reserve on the system lately introduced of coppicing all badly-grown trees in a certain area, the extent of such area being proportionate to the demand there may be for wood of this description.

The following remarks of CAPTAIN WOOD, Conservator of Oudh Forests, were communicated:—

I do not know what *right* villagers have, but in Oudh, I believe, a great mistake has been made in *giving* villagers rights. I believe they never had them. The talookdars have some sort of control over the *waste lands*, as they were then called or considered.

The talookdars gave their villages, say 100 acres, at 4 annas an acre, and gave a certain amount of forest privileges into the bargain, the land not being worth 4 annas an acre—

Let x = value of land revenue.
„ y = „ forest revenue.
$x + y$ = 4 annas per acre.

Government comes in, takes up the waste lands, calls them forest, and hands them, sometime after, to a department, and takes, of course, nothing from the talookdars, who only pay for *land*. The talookdars still take the 4 annas (and a good deal more), and cry out for the villagers' rights. The talookdars only paying for the land revenue, are enabled to take much higher rates than they otherwise would and the Forest Department have to pay. Government either assesses the land at more than it is worth or loses revenue which is due to the Forest Department.

In the first case, the indirect excess should be credited to the Forest Department for revenue actually received in excess of what the land is worth; in the second, it makes a present, out of forest revenue, to the talookdar. In either way the talookdar gains. In either case, the Forest Departmentloses. It is immaterial to the villager whom he pays his money to, except that Government in the Forest Department would take less than the talookdar would do.

We have heard a great deal of the forest rights of villagers, it is time we should now hear of the forest rights of Government. I am not writing now of policy, I am writing of forest matters.

If it is the policy of Government to be very liberal, they should think where the wherewithal comes from: they cannot always be giving what I consider forest revenue away, and expect to receive it at the same time.

In Oudh the villagers, within three miles of the forest, are supposed to have free fuel for their own consumption.

In my absence, some 40 square miles of forest have been made over to the Maharajah of Bulrampore, and the whole rights of the villagers within three miles of the Oudh forests in Gonda extinguished. The villagers are tenants-at-will of the Maharajah.

Where are the rights of these villagers? I believe that the other talookdars, adjoining the forest, were to have the same control over the forest or waste lands. Government has taken over the forests; is the Forest Department to be credited with nothing? Is the talookdar virtually to have the revenue from the forests, and still Government require revenue from the forests? Roughly speaking, the villagers have to pay x + y; to the talookdar x for his land, and y for his forest privileges.

Now he pays x + y to the talookdar, though the talookdar pays nothing to Government for y.

MR. C. F. AMERY'S paper was then read on this subject, *viz.*:—

> "Principles on which a settlement should be effected, in demarcating forests, with villagers who have enjoyed the general run of the forests with undefined rights."

If this had been set me as a question in an examination paper, I should have replied: "The principles embodied in the Queen's proclamation to the people of India, and those principles of equity which have ever guided our administrators in their application." In practice, "define the rights and confirm them."

But in giving our adhesion to the easily intelligible and equitable principles of dealing with *rights*, we must not close our eyes to the broad distinction between rights and privileges, and we should by no means allow the extension of the same principles to the latter, be they conceded or usurped; to do so, would be as unjust and demoralising in the one case, as it is just and obligatory in the other.

The first point, then, in such a discussion is to come to a distinct understanding as to what severally constitute rights and privileges; and rights I would define as exclusive advantages enjoyed by an individual or community, as against all other individuals or communities. These are absolute rights.

The State, or, in other words, the people at large, may equally possess rights as against an individual, as, for example, the right of way through an estate; but the attempt on the part of any individual or body of the people to monopolize such privilege to the exclusion of the rest, would be as unjust an usurpation of a right, as if the proprietor of the land had closed the way against all comers. And this attempt on the part of individuals and communities to obtain exclusive monopoly of rights belonging to the public at large, is exactly what is being done in our forests, but it is the duty of the Forest Department, as servants of the State, to guard the property committed to their charge against such unjust usurpation.

Privileges, I would define as the voluntary concession on the part of the owners of any portion of their rights for an indefinite period and without specified consideration. The two conditions invariably go together; for where the consideration is specified, time will be always insisted on, and the enjoyment of the advantages for a specified consideration and for a definite period, makes it no more a privilege but a right. A right, nevertheless, limited as to time. Time and consideration, if implied, constitute a right as well as if expressed.

But while I have defined rights to be exclusive advantages enjoyed by an individual or community as against all other individuals and communities, the definition is somewhat loose, since it covers only absolute rights or rights of possession enjoyed by acquisition or by the holders of transferred rights of possession, but there may also exist subordinate rights, or rights of a class which the possessor cannot be deprived of without injury, but which, nevertheless, he does not enjoy to the exclusion of all others, except in so far as their exclusion is necessary to the maintenance of his own right.

I will here endeavor to offer a simple illustration of these various classes of rights and privileges. If I buy or otherwise acquire a freehold estate, I enjoy an exclusive right to its use or disposal. If I then sub-divide it into farms, and lease each for a period of one or more years, the lessees acquire severally exclusive rights as against all others and against me also, the specification of time and consideration constituting the right. These are absolute rights of a definite nature which the holders are severally exclusively entitled to. If a portion of my estate consists of a large moor, and in the leases of the farms I insert a clause empowering the several lessees to graze their cattle on this common, this permission to graze is a right, the consideration and time specified in the lease being applicable to this as one of its conditions, but it is not an exclusive right; for, in the absence of any agreement to the contrary, I may not only graze my own cattle on the moor, but also grant similar rights to others outside my estate; but only to such an extent as not to infringe the *bonâ fides* of the agreements entered into with my tenants. I may not infringe the rights which it was intended to be understood were conferred by the leases. Now, having cut my

estates up into farms and leased them for some years in this manner, supposing I were to sell to each farmer his holding, letting the moor go with the estate, and making over all my interest in it, the rights of the new proprietors to the grazing land would be absolute as against me and the public at large; but as against each other, they might be undefined. Half of them may after a time cease to keep cattle, the others only a few, with perhaps one exception, who makes cattle his chief business, and finding that he has the moor almost wholly to himself, increases his stock to the limits of the moor's capabilities. Now it would be very mischievous legislation that would say to this latter—you have enjoyed this moor so long that it is now yours, as a matter of right.

Again, let us suppose that while the estate was still in my hands there was also a large tract of wood land in it, which I valued only as game cover, and that after the farms had all been let, I was appealed to, to permit firewood to be collected, or an occasional tree to be cut for the shafts of a cart, agricultural implements, &c., and gave an unreserved sanction to go into the wood for such purposes. I confer no right, there is no consideration, no specification of time. It is a mere privilege which I concede, and which I may withdraw at any moment. If I am a careless landlord, this privilege will certainly be abused. From a stick for a shaft, my tenants will advance to a beam for a house, from collecting dry sticks for themselves they will advance to cutting loads of fuel for sale in distant markets. These are usurped privileges. Perhaps in time the value of timber and fuel increases immensely, and one of my tenants living conveniently near the wood, finding me careless and perhaps rarely on the estate, developes a regular timber trade. In this state of affairs, I die with my affairs somewhat involved, leaving to prudent trustees the management of my estate for the benefit of my young children.

If they act justly by my tenants they will confirm them in all the rights specified under their several leases, but if they act justly by my family they will withdraw those privileges in the wood which sanctioned by my carless good nature were abused to the detriment of my property; and administer the woods systematically for the benefit of my family.

There would of course be a great deal of growling among the tenants, especially on the part of the one who had come to regard the woods as his source of livelihood. But in the position of trustees, *privileges cannot be conferred on the one party without injustice to the other.*

Now, the Forest Department, as a branch of the State, is exactly in the position of trustees, not for one family, but for the people of India. The forests are the property of the people of India. To them we look for a revenue to be appropriated to the costs of just government of the people, and the greater revenue we realize, the greater the relief we afford from the tax gatherer; and while confirming to individuals and village communities such rights as they may have in the State forests, our duty to the people of India demands that pretended rights should be closely investigated, and where these are found to be mere privileges conceded or usurped, they should be at once rescinded, and individuals no more allowed to enrich themselves out of the pockets of the people.

If we now modify the problem so far as to make the question—"How should we proceed to deal with rights, real or pretended, set up by individuals in State forests?" I would reply, "I investigate them upon recognised rules of evidence. Where rights are found to exist, confirm them, but where pretended rights are found on investigation to be mere privileges conceded or usurped, rescind them, but upon such principles as to do justice between the individuals using or abusing them, and the people at large whose property we have to administer.

I have said that in investigating claims to forest rights, we must proceed upon recognized rules of evidence.

We shall find individual rights shown in practice to have been exercised by the individual or community enjoying them as against all other individuals or communities. It is not enough to establish a right that the individual or community shall have grazed their cattle, collected firewood, or felled timber in a forest time out of mind; it must be shown that the individual or community exercised the right as against all others; that no other individuals or communities have enjoyed the same privileges without payment of consideration to the individual or community claiming to hold it as a right.

It is not enough that an individual or community be shown to have enjoyed the privilege exclusively, for it may be a State privilege conceded to all, but not sufficiently valued to have been availed of by those living at a little distance. A charcoal-burner may have followed his occupation alone all his life, and supplied all the neighbouring communities, but he must be inferred to be merely in the enjoyment of a privilege unless it can be shown that other charcoal-burners have been in the habit of paying him for the right to burn charcoal, in which case a right must be held to have been established.

We shall find communal rights in which some half a dozen communities, more or less, claim a right of grazing in a forest in their neighbourhood. If these communities be shown to have exercised that right to the exclusion of all other communities, or better still if they be shown to have taken consideration from other communities for admitting them to a participation, a right is established and must be respected; but, if, on the other hand, it is found that while in ordinary years the forest is occupied only by the cattle of neighbouring communities, in times of scarcity distant communities have been in the habit of bringing their cattle and grazing them without consideration paid to the pretended holders, then must the so-called rights be held to be privileges enjoyed mainly by the nearest villagers from the accident of their contiguity, but privileges only, and to be withdrawn at pleasure.

We shall find also common rights as between individuals or communities and the State. Individuals or communities claim an exclusive right of grazing in State forests. Now, as against the State, the communal privilege of half a dozen more or less communities to graze their cattle at large over the forest must not be held to constitute a right, unless it be shown that the right has been exercised to the exclusion of other communities; but if the forest is divided into blocks, one for each community, and it is shown that each community has exercised its privilege within its own block to the exclusion of the other communities, then a right of grazing as against the State must be held to be

established, but we must not fall into the error of saying that the land is the villager's and the timber only property of the State. It would then cease to be a State forest encumbered with private rights, and have to be classed as private land saddled with State rights. Such a view is in complete opposition to the practice of existing native states, and we should require actual evidence of the cession of the land before admitting the right.

MR. B. POWELL.—Yes; this is quite true, the rights created at some of our early settlement—land to the people, trees to the State—are at complete variance with the whole theory of property that obtains in India. They sprang out of the moral consciousness of the settlement officer.

The question speaks of "undefined rights;" a right becomes such only when it is defined. The action to be taken upon consequences arising from the exercise of the right may be undefined, more especially if the consequences are not foreseen at the time of granting the right. If I allow A, on payment of a consideration, to graze his cattle in my compound for a year, the right of grazing, as far as the capabilities of my compound go, is a defined right. If I turn in fifty more cattle which eat up all the grass in a month I infringe his right. On the other hand, A has no right to drive his cow into my cabbage plot and let her eat my cabbages. It was not part of the right conceded, but if I have a lot of shrubs sprinkled through the grass land, and A's cow browses off the young shoots, the action to be taken in this matter is undefined. If A urged that I ought to have foreseen this, "for it is their nature to," I should feel probably that I had no remedy against him in equity, but I have a right to fence in my shrubs, provided I do not thereby infringe unnecessarily the exercise of A's right of grazing.

MR. B. POWELL.—It is not necessary that a right should be defined to make it a right. The instance of a right to graze cattle in a man's compound is a partly defined right, defined as regards the land, undefined as regard the number of cattle, unless there was an implied definition that the number was not limited save by the capacities of the area. But a man may have a *bonâ fide* right to graze an indefinite number of cattle in a range of hills, let us say,—the limits of the exercise of the right being perfectly indefinite.

Having now laid down the method to be adopted in investigating claims to forest rights, and stated the general principles which should guide us in dealing with them, I proceed to show the general application of these principles to some known conditions.

Firstly, as to right of fuel or timber in State forests, I may say at once that I have never met with nor heard of a state of things fulfilling the conditions which I have laid down as necessary to constitute a right excepting in the state of Chamba, where rights were created by the resident when we leased the forests.

MR. B. POWELL.—This is hardly correct. The people of Chamba were *accustomed* to do certain things, and to exercise certain privileges, either with or without payment, but no right was ever claimed or given. The Superintendent, on the new lease and rules being made, claimed, that as a matter of policy, privileges should be conceded in a certain class of forests, and even in preserved forest where there would have been a great hardship otherwise; but no *right* has been conceded, nor is there any sort of forest right in Chamba, which cannot be commuted from one place to another, or extinguished altogether if the Raja pleases.

There are no claims set up as against all other individuals or communities; the claim is made without any attempt at interference with others wishing to exercise similar privileges. They are privileges pure and simple, and to constitute them rights and confirm them to the few who have had the greatest enjoyment of them hitherto, would be mischievous in the extreme. Shall we let A, who chances to live on the confines of a forest, get his tree for nothing and charge B, who has to cart it 20 miles, five rupees for his tree? Surely such a procedure could only be justified on the ground that A had a right of property in his tree, and there is no evidence whatever of the existence of such right.

There is no country in the world in which men not born to the purple, exercise such absolute power over the well-being of the people they rule as the district officers of India; and no matter what the individual character of the man, the national character acted upon by the influence of his position, and by the national characteristics of the people he rules, is almost inevitably certain to result in the endeavor to secure the good will of the people becoming his mainspring of action.

Desirable as such results are in the abstract, they commonly result in narrowing down the vision of an officer to his individual district. He will close his eyes with complacency, and feel that he has done a good work if he has confirmed a tenant-at-will in the absolute possession of his holding, or secured to a village the perpetuation of a privilege to help itself to wood from a neighbouring forest—and closes his eyes to the fact that these concessions are spoliations of the people at large, for the benefit of those whom accident and not desert, has brought within his influence. It is enough for him that he had done his best for the well-being of the people of his district. "Let other district officers imitate him and all will be happy."

Now, it is especially this narrow policy that we as a State Department must set our backs against, and none the less earnestly that in doing so we must array ourselves against well meant benevolence, none the less earnestly that we know that the individuals whose claims to rights we disallow, will contrast us unfavorably with the district officers who advocated their claims, while the people at large in whose interests we act, are too little versed in the matter to see cause for thankfulness; but justice is paramount to, and broader than, sentiment.

A, who lives in the neighbourhood of a forest, will always from the accident of neighbourhood be able to buy his wood in a cheaper market

than B who lives 50 miles off, and it would be a very narrow sympathy that would give A his tree for nothing and charge B five rupees for his.

DR. SCHLICH.—I do not agree to this. The owner in the first place has quite a right to decide who shall enjoy privileges, if it is his policy to allow any. But I think the people who live near a forest, and from their position have always been accustomed to look to the forest for supplies, have a greater claim than people further off and never had the idea of being supplied by the forest.

MR. RIBBENTROP.—It is quite possible that the people further off once had forest close to them and they used it up.

MR. B. POWELL.—All property is an accident to some extent; one man is better off than other, just as often by the accidental advantage of his position, as by his own exertions. A, who lives near the forest, has always been accustomed to get wood from the forest. B probably never has: if you deprive A of his advantages you injure him merely to put him on a level with B to no purpose.

DR. SCHLICH.—Privileges are conceded because of a sort of moral though not legal right, and there is this sort of moral right in the case of persons who, living near a forest, have long been used to get produce from it. Those further off may probably have other advantages on their part and have never been accustomed to look to the forest in the same way as the neighbours do.

It must be borne in mind, too, that rights conceded in forests in which the timber is now of little value must be abided by for all time.

In Germany such rights were conceded long ago in unsettled districts, loosely worded perhaps at first, but in time the quantity to be taken annually was strictly defined. Many of the forests thus saddled are now valueless to the State, the quantity claimed by communities being often in excess of the whole outcome. They are *defacto* private forests worked by the State for the benefit of the proprietors, with the simple reservation that if the yield is in excess of a given amount, the State may take it.

Grazing rights in State forests are frequently *bonâ fide* rights. The conditions laid down as necessary to demonstrate the existence of a right are found in exercise. There is a right on the part of the grantee as against all others. Such rights being proved, they must be confirmed, but in a true spirit of equity. They must not be exercised to the prejudice of other rights, that is to say, the "right of the people at large of which the State is guardian." The case of the cow in the compound crops up again here. The cattle trample down the seedlings and destroy them, the old trees gradually decay until by-and-bye the last has gone to decay, and it is all grazing ground.

In such a state of things the cattle owners have not exceeded their rights, but the State has neglected its rights. Its duty as steward of the people's property was to fence off small areas from time to time, throwing them open only after the young plants were too strong to be trodden down, or the State might have effected a compromise by giving up exclusive possession of a part for exclusive possession of the remainder. But when a forest saddled with grazing rights as above supposed becomes all grass, the duty of the State hitherto neglected must not now be supposed to have wholly ceased; the land is not, as some district officer would make it, the property of those exercising grazing rights. It is State land to be administered in the interests of the people at large.

But on the subject of privileges as distinct from rights, although I have urged that they should be rescinded, I have urged that it should be done in such a manner as to do justice between the individual or community enjoying them and the people at large.

There are immense forest tracts in which grazing privileges to all comers have been conceded for an indefinite period. In the interests of arboriculture and in the interests of the people whose estate we administer, it may be prudent to exclude all cattle from the forest, but in our past neglect of our duties, we have led individuals to hope that these privileges would not be hastily withdrawn, and in this hope they have bred cattle to an extent that rendered it impossible to procure fodder outside our forests, and the loss which would be entailed on them by exclusion from the forests would render such action, if not manifestly unjust, at least harsh and ill-considered in the extreme.

DR. SCHLICH.—This is the case in Sindh. The people in the hills to the west can only keep their cattle during the monsoon, and they are obliged to come down to the forests on the river border for grazing at other seasons, or else their cattle would perish: arrangement has to be made for grazing in such cases, but it must be on a definite principle.

MR. B. POWELL.—This practice of the people is, however, not a right nor even a privilege, because they pay for it. That reminds me of the case of the Punjab "Rukhs." Here the people pay for grazing; I mean other people besides those who get grazing at half rates in some districts; still they expect to find the grazing open; and if we were at once to close grazing in all places, it would give great inconvenience, so that we have to extend our consideration to the wants of people who have no privileges even. But then all these matters must be arranged so that the property is not injured.

The privilege must be extended, but under such restrictions as reduces the evil to a minimum, and on payment of such a consideration as

in the interests of the people we have a right to demand; and when the money value of the damage done by the cattle is excessive, the consideration should be fixed high with the double object of covering the damage done, and of preventing the extension of a calling, lucrative it may be to individuals, but prejudicial to the interests of the people at large.

To some the principles I have laid down for dealing with rights and privileges in our forests may appear harsh, but the experience of England, France, and Germany has shown that the existence of private rights in forests is utterly incompatible with a satisfactory administration of those forests; that whatever rights are conceded now, however insignificant they may appear, will by-and-bye have to be bought up by the State at a cost which will be a lasting burden upon the forest revenues.

The concession to a village at this present of a right to collect firewood and cut a few sticks for building purposes, implies only such a small quantity of firewood as might otherwise go to decay, and such a few crooked poles per annum as is sufficient to maintain some fifty hovels perhaps in their present state; but under a settled and strong Government some of these villages will become towns, the wretched hovels of the present will be replaced by substantial tenements, the timber for which would constitute such an important drain upon the forest yield as to necessitate a commutation of those rights. These commutations must be carried out in a liberal spirit, and a concession not now valued at five rupees per annum may fifty years hence require a lac of rupees to commute it. Those who laugh at such a conclusion, history teaches in vain.

DR. SCHLICH.—This warning is very much called for.—(General approval expressed.)

It is on these grounds that I argue for the strictest investigation of all claims to forest rights; for the registration of such as are proved, where it is not at once deemed advisable to commute them; for the withdrawal of all privileges, where their exercise exerts an appreciable effect upon the forest revenues. We do not close our forests for hunting grounds as some native rulers do; we look forward to working them upon a system which shall result in the sale annually of a quantity equal to the increment; and it is the privilege of all to have their requirements met from this supply. The villagers in the neighbourhood of our forests will always find a cheap market to buy in; but now that the matter is in our hands, we shall be unwise if we close our eyes to the experience of France and Germany, and untrue to the trust reposed in us by the people of India, if we blindly allow the State forests to be saddled with private rights which like foul cancers will spread, until by the time we have found out how our forests might have been worked economically and made one of the principal sources of imperial revenue, we shall find also that the rights with which, with a misjudging philanthropy, we have burdened them, have grown sufficiently to absorb the bulk of those revenues.

A revenue which ought to be second only to the land revenue of the country will pass into the hands of private individuals, who never knew they had a right to it, until some philanthropic district officer put forward the claim for them.

If it be argued that the conditions I have laid down as necessary to demonstrate the existence of a right are too stringent; that the privilege of cutting wood conceded to an individual or community is none the less a right, although similar privileges have been conceded to other individuals and communities, in fact to the people at large, I am ready to meet my objectors upon this ground—I am willing to admit for argument's sake that the native rulers who preceded us voluntarily and for all time, and for consideration not clearly specified, made over the forest to the people with unreserved right to apply its product to their requirements.

We arrive then at the conclusion that the forests are the property of the people, and the question for our consideration resolves itself into this:—"Does the State infringe these supposed rights by taking upon itself the stewardship of the forest and administering them for the people," and if this question is answered in the negative, comes the pertinent question—Would the State be true to its trust if it alienates a portion of this property for the benefit of individuals who can show no claim to the past enjoyment of privileges, from participation in which the people at large were excluded.

MR. B. POWELL.—I think this is one of the clearest and best papers in this subject we have yet on record.

MR. B. BROWNE.—It is excellent, and the subject is very clearly put.

MR. B. POWELL.—Practically we want a *defined policy* on these subjects; the recognition of how we are to deal with (1), rights, (2), privileges, and (3), general wants of people according to their trades and occupations. Everything at present is left to be done and undone by the opinions of individuals. It is the duty of the Supreme Government to lay down a policy and insist on having it carried out. The most difficult, but absolutely necessary work in forest organization, is this: We must have a clear settlement of rights and privileges on a definite policy, and we must not have it in the power of any one who pleases to upset that. At least if the settlement is upset, the conservancy of the forest must be abandoned *pro tanto*, and responsibility cannot lie on the officer in charge to effect improvement of a tract in which there have been no settlement of rights on a regular and defined system. With every possible respect, and fully appreciating the motives of the order, I must deprecate the issue of such orders as were recently made in the Montgomery district in the Punjab. There a regular settlement, perhaps not quite definite enough, but still a great improvement, had been made: it aimed at one chief object, that is, that in all coppice woods, and in all cases of natural reproduction, you *must* stop grazing to allow reproduction. So it was arranged that in blocks

which had been *cut out* for Railway fuel the site was to be absolutely closed and that grazing had to go on in blocks, of which a map was prepared. This arrangement, after full discussion and with the full consent of the civil and revenue authorities, was sanctioned. Now, had certain definite instances of hardship come up, I would be the first to give in; but not by a general order that will, I am sure, be *thoroughly* misinterpreted, but by a definite settlement map in hand, as to the specific wants of the specific villages who were shown in enquiry to be hard pressed. The orders were general, and it will, I fear, be found that they have been interpreted to allow a general laxity *all* over the place. One instance Mr. B. Browne has given. Acting on these orders, but of course going far beyond them, I hear, that the people are allowed everywhere to lop the trees in *Government Reserve* (they have large areas of their own), and that the local authorities will not prevent them.

Now, this is a great pity; I am sure if this was represented to the Punjab Government they would reconsider the matter, because every one readily consents to the spirit of the order, but its application has been mistaken.

DR. SCHLICH.—As an instance of the necessity of stopping grazing and of the results of it, I may mention that in Sindh, when I came, I could not find a single seedling in the babul forests. I had about 20 acres close to Sukkur experimentally enclosed. Sometime afterwards I found this area perfectly covered with seedlings like young wheat.

MR. CAMPBELL.—This area has since been extended to 500 acres with similar success wherever there are seed-bearing trees in the vicinity.

MR. MCKEE.—I may instance the case of two blocks of the Sathpoora (hill) reserve in the Central Provinces. It is mixed teak forest; both had at the end of July a considerable number of seedlings of teak and *terminalia*. Into one, after fencing two or three small plots of seedlings, cattle were admitted, and fire that generally follows cattle: the other block was protected for cattle and fire. The cattle were let into the unprotected block on 1st August in proportion of one head of cattle to 15 acres.

On the 25th November, when the blocks were examined, it was found that in the unprotected block the seedlings (except in the little hedged patches) were *completely destroyed*. In the protected block a large number survived, though some had perished from drought.

SUBJECT VI.

SYSTEMS OF EXTRACTING FOREST MATERIAL BY PERMIT, LICENSE, &c.

MAJOR PEYTON'S paper was then read:—

On the comparative merits of system of extracting forest produce, (1) *by permit,* (2) *by license to remove material, and* (3) *by Government agency.*

I would premise the observations which I propose to make on this subject, by stating that the three systems of permit, license, and direct Government agency obtain in the working of the Canara forests, both as regards the extraction of forest material and produce, as also the supply of the local wants of the people in respect to timber and firewood.

2. The ruling system in this district is, however, that of direct Government agency, and the sale of the produce at established depôts, the permit and license systems being permitted in a very restricted form only, and chiefly to meet local requirements.

3. A general permit or license system, between which I cannot distinguish any material difference (except under the circumstances to be noted hereafter), I would object to, as tending to a waste of material and corruption of many kinds.

MR. B. POWELL.—I am to blame in proposing the question for not putting it more clearly. By "permit system" I meant that the purchaser was allowed to remove *specified* material, *i. e.*, trees that had been marked or girdled for him, or to take firewood, &c., from a defined area, the selection of the trees or area, as the case might be, being done or intended to be done by an experienced person, who made his selection on forest principles. By the "license system" I meant one in which the purchaser merely paid for what he took, and had no one to control him as to *what* he took or *where* he took it; such is the system in parts of the Central Provinces and in the Punjab in some cases. In a word, I meant to draw a distinction between the removal of produce specially selected by Forest officers (permit system) and removal of it without such selection (license system).

Moreover, I fail to see how a permit-holder, unless he *joins in, or holds out, hopes of a partnership* in his gains by fraud, can extract timber from the forests, and convey it to a market for sale at a less cost than if brought by direct Government agency.

MR. RIBBENTROP.—This is perhaps doubtful; the permit-holder employs his own men direct. Government often

has to employ a contractor who has to make his own profit over and above the bare wages of labor. The permit-holder pays the price of labor: the Government has to pay the price of labor *plus* a profit to the contractor.

MR. B. POWELL.—The loss to Government on the permit system in Burma is enormous, especially on log, and for logs that fetch high prices; in these cases it is Rs. 20 and Rs. 30 a log, and the general average loss calculated on all timber for nine years is Rs. 4-5-0 per ton of 50 cubic feet.

During these last nine years the total amount of permit timber extracted, *viz.*, 2,24,927 tons, represents therefore a loss to the State of Rs. 9,71,247! On the Salween the experienced Deputy Conservator, Mr. Slym, estimates the loss from different forests at from Rs. 6 to Rs. 14 *per log* (I have not the data in tons).

MR. LEEDS.—But one element has to be taken into consideration. The permit timber is chiefly from the Sittang, the Government timber from the Tharawaddy Division. The cost of getting it out from the former, if done by Government agency, would be higher, and therefore the comparison is not quite just between Tharawaddy Government and Sittang permit timber.

MR. B. POWELL.—That is true; but still *all* of it is not Sittang permit timber; this consideration should no doubt influence the results; but if you strike off even 50 per cent. for the difference, you have still a loss of Rs. 4,50,000 or thereabouts.

In the one case an expensive supervising establishment would have to be retained to see that the permit or license-holder acted up to the conditions of his license. In the other, a very limited establishment would be necessary to see that the timber selected for removal from the forests by Forest officers was duly brought to the depôts.

The license-holder being the actual proprietor of such timber and produce as he would remove under his license, it would be his interest to make the most of his opportunities by insuring to himself a larger profit without reference to the future conservation of the State forests. It would be his object to substitute good for defective timber, and to smuggle a larger quantity out of the forest than his license or permit allowed.

The system of selling standing timber, or timber in any form, *in the forests* is most objectionable and open to the greatest abuse; for however energetic the officer may be, he yet cannot see to everything with his own eyes, and though the permit may be for defective or an inferior class of timber, every means will be taken to substitute a better class and get it smuggled out of the forest. It it needless to point to the difference between the two kinds.

I believe that the permit or license system formerly existed in Canara as also in Belgaum, and with the most baneful results. The comparative merits of the two systems may be thus briefly stated :—

1st.—That extraction by direct Government agency and the establishment of depôts aims at securing the largest possible revenue, and at the same time the improvement of the property of the State, to meet the requirements of future times.

2nd.—That extraction by license or permit means the extraction of the largest possible revenue to the permit or license-holder for the time being, without reference to the future well being of the forests.

MR. B. POWELL.—Or rather this applies to the license-holder, who cuts material he selects himself, and is indirectly applicable to the permit-holder, who cuts material selected for him, because he has so many opportunities of taking more than his due is, working carelessly and wastefully and without interest in the forest.

Under the first system contractors may be employed to convert and bring in timber to the depôts with a moderate supervision, and without any fear of the substitution of one description of material for another. Contractors have neither interest nor object in acting otherwise, as their wages or rates are previously determined by agreement.

The permit or license-holder and his contractors have expectations to be gratified, and are well assured that *their* gains will be larger in proportion to the finer and better timber they can remove from the forests.

Again, I do not believe that in forests, where the work is heavy, a few permit or license-holders could carry on all the operations for the extraction of the required produce. To ensure an adequate supply to meet the demands would involve an indiscriminate issue of permits or licenses to all applicants or the supplementing of working part of the forests by direct Government agency and the establishment of depôts. The result of this would be clashing of interests and roguery bred by the confusion of property, which may be better imagined than described, leading the department into litigation.

CAPTAIN WOOD, Conservator of Oudh, sent the following :—

When we have sufficient agency, there is no doubt, in my opinion, that working out forest produce should only be done by Government agency.

We must have the forests in our own hands, and work in our own way if we want to improve them. Fires had been for some years kept out of the Bhinga forest when worked departmentally; unfortunately one year the officer in charge let out the contract for Mowah

blossoms. It was the interest of the Mowah contractor that the ground should be free of grass for the collection of the fallen blossoms.

Curiously enough a fire that would effect this, broke out immediately after the contract was given; the ground was perfectly free for collecting the fallen flowers.

But the permit system in Canara is widely different from the one above, compared with that of "by direct Government agency." Here it exists under special rules, (copy appended) as a means of conferring upon the inhabitants of the district *only, and not on outsiders,* certain privileges, whereby their wood requirements are secured them at low or merely nominal rates, averaging, according to the quality of the material, from Re. 1 to 3 per candy of 12½ cubic feet. The appended rules fully explain the system, so that it only remains for me to add that a special protective establishment, at a monthly cost of Rs. 165, is employed all the year round to see that the people are found in their wood requirements according to the rules, and the conservancy of the forests from which the supplies are drawn properly secured.

MR. B. POWELL.—Is it possible to do this with an establishment of Rs. 165 a month?

Is all the material to be removed selected properly with a view to the producing power of the forest?

The license system referred to as existing in a very restricted form is only applied to the export of bamboos. For this purpose certain bamboo tracts are marked off, and a small establishment, for the seven months in the year during which the forests are open for the working, sanctioned. It is the duty of this temporary establishment to live in the forests where bamboo cuttings are being carried on so as to exercise a proper supervision, whilst the permanent establishment by means of passes and checks at the frontier posts secures payment for the bamboos removed under the licenses given at the talúka treasuries. In this particular only (the cutting and export of bamboos) is the license system known or resorted to, the perishable nature of the material compared with timber making it desirable to avoid the storing of it in depôts.

To conclude, I will close this with the following statement showing the average yearly receipts and expenditure of the *last five years* in Canara under (1) by permit, (2) by licenses, and (3) by direct agency, &c.

	Average of yearly receipts.	Average of yearly expenditure.
	Rs.	Rs.
By Permit	19,039	1,815
„ License	19,932	600 about.
„ Government agency, &c. ...	3,64,949	82,417

Rules for the grant of Permits to cut Timber, Bamboos, &c., in the Canara Collectorate.

It is the desire of the Government of Bombay that in future supplies of timber should be cut by the officers of the Forest Department, and collected in convenient depôts where it will from time to time be sold by public auction under the rules that may be in force. In this way people will be able to procure timber at the sales, but it is necessary to make provision so that the ryots of the zillah may have the means of getting wood, bamboos, &c., which they may require for their own wants and not for purposes of trade. The following rules regarding permits to cut wood, &c., on Government land are therefore published:—

I. The ryots may in accordance with customary usage cut and collect in the Government forest of their own villages, when not specially reserved for the growth of timber or other conservancy purposes, the following sorts of forest produce:—

(1.) Bamboos of sorts.
(2.) Jungle-wood for small houses, huts, chuppers, cattle-sheds, &c.
(3.) Dry wood for fuel.
(4.) Leaves and grass for manure, &c.
(5.) Thorns and brushwood and stakes for hedges and dams.
(6.) Wood for agricultural implements.
(7.) Dead sago and other palm trees for water-courses, &c., excepting always squared timber for houses of a superior description, planks for solid wheels of carts, wood for rice-grinding mills or the rollers of sugar-mills, and any other descriptions that may from time to time be prohibited. They must not trade with the wood, &c., so cut, and must not cut or destroy any trees of the kind excepted under Section 5. The patel and coolkarny will be responsible that this rule is not abused. In the case of villages within the boundary of which there is no jungle, an adjacent tract beyond the boundary will be set apart for the use of the villagers (this they must take great care of, as they will not get any more when this is exhausted), who must, however, before resorting to it produce before the patel or other officer in charge of it a permit from their own village officer.

II. Except in such villages as the Collector, acting in concurrence with the Conservator of Forests, may exclude from the operation of this rule, owners and cultivators of the land are permitted to clear away all small brushwood and thick low jungle within 50 feet of the boundaries of their cultivated land, so as to secure their cattle from the depredations of wild animals, and they may use the brushwood and small wood cut for their own purposes, but this provision does not extend to any trees of the nature specified in Rule V.

III. Except as provided for in the above two sections, no one is to cut wood of any description in any Government land in Canara without a permit in writing from the māmlatdār or mahalkarry of the district, and any one found cutting wood, &c., without such permit will be liable to be prosecuted according to law.

IV. Persons requiring permits should apply to the māmlatdār or mahalkarry of the district, stating the quantity and the description of the wood, the purpose for which it is required, and the number of trees

required, and depositing the fees according to the rates which may be in force. A form of permit to cut is annexed.

V. Permits for cutting the trees noted in the margin shall not be given without the special sanction of the Collector, and for cutting these special rates will be imposed, and from time to time, as found necessary, fixed by the Collector in communication with the Conservator of Forests.

(1.) Teak.
(2.) Sandal.
(3.) Blackwood.
(4.) Ebony.
* (5.) Honnay.
† (6.) Sirhony (Toon).
(7.) Muttee.
(8.) Bulghay.
(9.) Kurrymootal.
(10.) Sownee.
Any other which may from time to time be added.

VI. Subject to the conditions of Rules XXIV to XXVII, and if the fees are less than Rs. 25 and the māmlatdār or mahalkarry sees no objection to the grant, he may give a permit. If the fees are more than Rs. 25, he should report the case to the assistant with his opinion. The Assistant Collector may sanction the issue of any permit, the fees on which do not exceed Rs. 60, provided that no person shall be permitted to cut more than 50 candies of squared timber within ten years without the special permission of the Collector. The Collector shall not sanction the issue of any permit in excess of 100 candies without a previous reference to the Revenue Commissioner, through the Conservator of Forests. For every grant of more than 50 candies, it shall be competent for the Conservator, in communication with the Collector, to exact special rates not exceeding twice the ordinary rates in force.

VII. A register shall be kept of all applications in each village, and no permit shall be granted till the register shall have been examined, and it shall appear that applicant has had no grant within a reasonable period, and that he is *bonâ fide* in want of timber for the purpose indicated.

VIII. Permits should be granted as soon as possible after the date of application, and should be issued for as short a period as is consistent with the facilities of cutting the timber. The permit should specify the number of trees to be cut and the village "phirka" or jungle in which the wood is to be cut, and due intimation should be given to the patel and coolkarny; the exact trees to be cut will be pointed out to the applicant by the Forest subordinates deputed for that purpose.

IX. Permission will not be given, except in emergent cases, to cut timber from the 31st of May to the 31st of October.

X. No person should continue to cut after the expiry of the time mentioned in his permit, but he should, if necessary, apply for an extension of time.

XI. The person to whom a permit is granted should report to the patel or to the māmlatdār or mahalkarry as soon as he has cut the number of trees specified in the permit and the wood is ready for measurement, and no wood should be taken away from the forest till it has been measured and stamped with the permit mark (S).

XII. The wood will be measured after being squared, except in the case of bamboos, firewood, and poles, and in measuring it all logs of one-fourth candy and upwards, and all branches capable of producing logs of that size, will be estimated. If the total quantity is less

* *Pterocarpus marsupium* (Kino tree). † *Calophyllum sp.*

than that entered in the permit another tree or trees will be pointed out, or the difference of the fees will be returned to the grantee. If the tree pointed out to the applicant yield a greater quantity of timber than that permitted, the excess will be charged. This measurement or stamping of the timber cut on permit will be done by a fit and responsible subordinate of the Forest Department.

XIII. When any person has received a permit under Rule IV, he must not use the timber for any other purpose than that assigned in the application for permit, and if he is found so using it, it will be liable to confiscation, and after inquiry such case should be reported to the Collector, who will, if he considers it necessary, pass orders for confiscating the wood and for prohibiting that person from ever receiving a permit under these rules.

XIV. The whole or part of the fees will be remitted in the following cases:—

1*st.*—Works of public utility.

(1.) Village chowkies.

(2.) Village schools.

(3.) Dharmasālas or rest-houses.

(4.) Covers, fences, &c., of public wells.

(5.) Bridges over nullahs and water-courses.

(6.) Works of *bonâ fide* public utility when paid for by private contribution or out of local funds not particularized above.

2*nd.*—Repairs of village churches, temples, muts, mosques, and grants for religious edifices not the property of individuals but public as regards whole sections of the community.

3*rd.*—Reconstruction of houses injured or destroyed by fire, flood, or similar calamity if the houses so injured or destroyed belong to persons paying revenue to Government, or their tenants, or to lowly paid Government servants. Construction of houses which Government servants may be obliged to erect in consequence of their being stationed at newly established revenue and police stations, where there is not sufficient house accommodation.

4*th.*—In cases of distress or poverty not coming under the above heads the Conservator is authorized to remit the permit fee to the amount of Rs. 15.

XV. The Assistant Collector or Deputy or Assistant Conservator of Forests will have authority to remit the fees up to Rs. 15 in any one case. All cases in which a larger sum is to be remitted should be reported for the orders of the Collector, or, if necessary, of the Revenue Commissioner or Government.

XVI. The number and date of the order for remission should be noted on the back of each free permit, and the full value of the fees should be credited to the forest revenue, corresponding debit being made of the sum remitted.

XVII. The owners or occupants of lands which have not paid revenue to Government from a date anterior to 1st January 1844 may purchase the right of ownership in the timber growing in their fields, on application to the Collector, who in concert with the Forest officer will fix its value.

XVIII. All timber passing in or through the Collectorate of Canara without a pass or rahadāree from some officer authorized to give passes will be liable to detention for inquiry.

XIX. The māmlatdars or mahalkarries, or any subordinate forest officer having special sanction, will give passes (rahadārees) for all timber carts on application and after inquiry.

XX. When timber, &c., is to be exported beyond the inland frontiers of the zillah above the ghâts, the māmlatdār or mahalkarry, or any subordinate forest officer having special sanction, will give a pass on *green paper*, which must be exchanged at the appointed frontier *naka* for a similar pass on *white paper*. Passes on *white paper* will not be effective for passing timber at any of the stations in Canara, but are only of use in other zillahs. Forms of these papers are annexed (B and C).

XXI. All wood, &c., bought at public sales (revenue, magisterial, civil, or forest) is entitled to a pass for export.

XXII. Passes for export may also be issued for wood, &c., granted on seignorage and converted to the use for which it was originally granted when it is desired to export it, provided that such wood, when sold to outsiders, should be charged on export an additional fee of Rs. 50 per cent. on the seignorage paid or remitted at the time of cutting.

XXIII. This additional fee may be reduced or remitted by the Collector, or his assistants or deputies, in cases of wood so exported when it is given for charitable purposes, or where the grantee moves his abode to another zillah.

XXIV. Permits to cut wood in the Government forests will not be granted to any persons who are able without difficulty to supply themselves with the timber or other articles they require from the timbers depôts.

XXV. In the event of any villager to whom by usage a permit to cut in the Government forests would have been granted being refused a permit on account of the proximity of a timber depôt, such person may, at the Collector's discretion, be excused from the necessity of purchasing his timber by public auction, and it may be issued to him from the depôts on payment of a price calculated to cover the cost of cutting and carting (including superintendence), and the seignorage fees of the district, as may from time to time be fixed, these fees, but not the cost, being remitted in cases coming under Rule XIV.

XXVI. Permits to cut wood in the Government forests will not be given to cultivators who have many suitable trees other than fruit trees (which are excepted) standing in their own estates.

XXVII. Whenever it is discovered that large and valuable trees have been cut down without permission in the Government forests adjoining any village or town, and there is a clear and reasonable presumption that such trees must have been cut with the cognizance of such villagers or town people, and they fail when called upon to supply any information which may lead to the apprehension of the actual depredators, then Section 37 of Regulation XII of 1827, which is printed below, will be put in force :—

"When robbery has been committed within the boundary of a village, or the perpetrators of a robbery have been satisfactorily traced

thereto, and neglect or connivance be charged against the inhabitants or the police establishments with regard to prevention, detection, or apprehension, it shall be competent to the Magistrate to investigate the matter as a criminal offence, and if the fact be well substantiated to exact a fine not exceeding the value of the property lost, the whole or part of which may be awarded in compensation to the owner, according as the degree of caution and activity which he evinced on the occasion may deserve."

MR. McL. CAMPBELL.—The object of the Canara rules is, I conceive, to limit and bring under control what there was reason to apprehend the people would begin to claim as a *right*.

The people were in the habit of helping themselves to firewood, wood for agricultural purposes, &c. Had rules not been framed, this habit might in time have been alleged to be a right.

Had the rates of wood, however, been very high, the discontent felt would have invited the claim of right, and much trouble been experienced.

To establish the right of Government in a gentle way, and prevent any disputed question of right, was of more importance than to raise revenue.

But a certain amount is raised, and the place for which the material is removed, as well as the quantity and quality of it, are controlled.

It is a pity that similar rules were not introduced into the other districts of Bombay before supplies of wood for domestic and agricultural purposes were claimed as of *right*, as is now the case in Tanna and other districts.

COLONEL PLAYFAIR (Deputy Commissioner of Nimar) then read a paper on "Forsyth's system" pursued in the Nimar District—its practical merits and demerits as shown by four years' experience of its working:—

The whole computed area of Nimar is 3,250 square miles, of which 1,894 is Government waste. A tract, 141¾ square miles, on the south bank of the Narbada, from its junction with the Kaveri river on the west to the Chota Tawa on the east, forms, the "Punassa Reserved Forest." The remaining area is the unreserved forest and waste land under the management of the district officer.

2. The first attempt at systematic forest management was made in 1857 by the then Political Agent, Captain Keatinge, the rules in force being it is said of a most minute and vexatious kind, and the system of collecting the revenue unnecessarily inquisitorial. In 1865 the Central Provinces rules were applied, which allowed the agricultural classes to

provide themselves with every sort of produce, except a few reserved species of trees (only to be cut under special sanction) on payment of light duties. Subsequently the leasing out the collection of these dues every year by public auction was introduced.

3. This was the system in force when Captain Forsyth assumed charge of the district in April 1869. He then found that so many abuses had sprung up under the farming system that he determined to resort to direct collection of the forest dues, and at once set about to frame rules and inaugurate a system of his own with this object in view. This was done in 1869-70, and in the Central Provinces has become well known and is generally recognized as "Forsyth's License System." It has already been introduced into several districts of these provinces, and in the present year will be brought into force in others also.

4. It must be remembered that in introducing his system Captain Forsyth's hands were much strengthened by the fact that the people of Nimar had been groaning under the harsh action of the forest lessees for some years—action which had in many instances driven graziers with their herds from Nimar, these not being tied down like the resident cultivators.

5. In introducing the change a printed circular was distributed giving a full explanation of the plan. It was pointed out that the measure was introduced in the interests of the people themselves, as much as with a view to better forest conservancy and to increased revenue, but that much of its success depended on the integrity of the people themselves, and that if contrary to expectation it should turn out that a dimunition of revenue occurred, it might be necessary again to revert to the farming system.

6. The whole of the unreserved forests of the district have been thrown open—(1) commutation tickets or licenses are granted to all residents of agricultural villages, whether agriculturist or not, for grass, firewood, and small timber required for agricultural purposes at a fixed sum per household per annum: these entitled the holder to take as much of these articles as he requires for the use of himself and his *belongings*, and from any unreserved forest in the district; (2) yearly licenses for cattle grazing, giving admission to all forests, are issued at so much per head according to description of animal, (3) for firewood and grass (if taken for sale), building timber, bamboos, charcoal, and lime (burned in the forests), mhowa, gums, chironji,* and other kinds of minor forest produce, special licenses are issued for any required number of cart loads, animal load, or head load; (3*a*) poor laborers are charged eight annas per family for a license to bring in head loads only, of the minor forest produce, chironji, gum, wax, honey, mhowa, &c.; (4) travellers' licenses are issued to banjaras and others at certain rates for grazing cattle for a period limited to 20 days. For longer periods regular grazing licenses have to be taken out.

* *Buchanania latifolia.*

7. All licenses are procurable at the sadr, at tahsilis, and from the lambardar or patwari of each village, these latter receiving a commission of 2 per cent. on all collections. Tahsildars and forest darogahs are also peripatetic distributors of licenses.

8. The only exception to the introduction of the above licenses throughout the district unreservedly is as regards the two large non-agricultural towns of Khandwa and Burhanpúr, the inhabitants of which

are excluded from the benefits of commutation licenses, the reason being the difficulty, if not impossibility, of checking their use in such large towns where but very few of the inhabitants themselves bring in their own wood, grass, &c. In lieu of these, however, licenses at reduced rates are issued to professional dealers in firewood, &c. All others in these towns must take out special licenses to bring in what they require.

9. A simple system of issue of licenses and check of receipts has been found to work perfectly. A supply of forms is kept in the sadr office, each description being printed in a distinguishing color and in foil and counterfoil. As they are distributed to patwaris or others for issue, the licenses are numbered consecutively, and the names of the distributors with numbers received by them are recorded, each being held strictly responsible for a due account of every one of the numbers entered against his name. The distributor is required to keep up a register of all issues made by him from time to time, and to enter in the counterfoil, and in this register, full particulars as to names, produce, number of head of cattle, fees levied, &c., as the case may be. At the close of each month, or as soon after as possible, the counterfoils are sent with an *irsal* and the money to the tahsildar, who grants a receipt and credits the collections in the treasury.

10. It is clear that a comparison (1) of the numbers issued from the sadr, (2) the numbers accounted for to the tahsildar, and (3) the numbers left with the distributors, forms a complete check on the distribution of licenses, and this check can be exercised at any time.

11. Tahsildars and darogahs obtained their files of licenses in the same way from the sadr. The former as *distributor* keep a register and an account with themselves as *tahsildars*.

12. The distinguishing color of ink used in printing the license forms enable the forest or other officials to tell at a glance, even should they not be able to read, whether the produce imported is covered by a proper license or not.

13. The rates payable under each description of license are shown in Table A attached to this paper. These have been simplified to the utmost, as there is no long tariff of rates for each individual article to puzzle either the licensee or the distributor. These rates were fixed on an average of those charged generally by private proprietors, and are in every instance much below what was levied from the people by the farmers under the old system.

14. In order to protect the large forest area (in round numbers 1,800 square miles), a considerable preventive establishment was necessary. This was organized and has since been added to and altered, and at present, or rather at the close of the official year, the strength of this establishment was three jemadars, ten duffadars, and 70 chaprasis. This is at the rate of one officer and five chaprasis to every 250 square miles of country.

15. In order too to enlist the services of informers in cases of breach of forest rules, a clause was inserted in the Forsyth rules, which he at the time described as "a mild self-acting punishment stopping short of criminal prosecution." This was by laying down that all produce removed without a license should be chargeable with double duty.

A doubt arose at the time as to whether this was strictly legal, but it was held that as the rules framed by the local administration under the Forest Act laid down that "in tracts managed direct by the district officer the rates shall be such as he shall fix," it was quite within the law to fix certain rates for produce covered by a pass, and other rates for produce not so protected. The extra duty levied is given to the informer through whose means it is imposed. It is thus the direct interest of outsiders to bring to light any attempt at evasion of forest dues. These double duties cannot be levied by any official below the rank of tahsildar.

16. The foregoing paragraphs have described the Forsyth License System as now obtaining in Nimar, the introduction of which has at all events proved a complete financial success, that is to say, the gross revenue which in the last year of farming was only Rs. 7,973 in three years reached Rs. 47,515.

17. There are no doubt several reasons why this system should work specially well in Nimar. The jungles resorted to are quite distinct from the well-peopled and cultivated tracts, whose inhabitants chiefly use them. Were it not so it would be more difficult probably than we have found it to maintain an efficient check on smuggling and fraud. In Nimar also, as compared with the large unreserved waste, the malgúzari jungle is not extensive; there therefore appears no reason, with perhaps a few modifications, why this system should not be brought generally into use in all those districts where the forests are not much scattered, and in which the malgúzari forest area is not disproportionate.

18. But wherever adopted, the issue of licenses and the preventive checks must be in different hands. The licenses must be procurable at the very door of the people, and the preventive establishment must have nothing to do with collection of dues. Here I consider is one of the chief merits of the system. The revenue is collected entirely by a machinery ready to hand and at a very trifling cost. The patwari (for in effect he is the chief distributor) cares not so much for the commission he receives as for the position it gives him. In Nimar the watandars look on a "huq" on Government revenue as a sort of personal honor, and in consequence the distribution of these licenses is done *con amore*. They have only to issue the license, collect the money, and pay it into the treasury, receiving their huq. The preventive establishment again have nothing whatever to do with money, so that there is no temptation for low paid officials either to defraud Government or to extract from the people.

19. Then as regards the people, the simplicity of the whole system is such that even the most rude and ignorant can understand. There are no intricacies of rates to confuse, and every man can procure what he requires from his own village accountant. Nor is there much room for wrong and annoyance on the part of Forest officials, and now that the system has fairly taken root in Nimar, the people are too well acquainted with its working to allow of any unauthorized interference. They know their rights and privileges and avail themselves of them.

20. Again, the perfect check as regards receipts of money actually collected I have shown in a former paragraph, and this, combined with the status of the great majority of our distributors, renders such a thing as fraud in collection unknown.

21. Take it as a whole the system is a very strong one, combining as it does a large revenue with much content to the people, but like every other system it has its weak points. I can see that, notwithstanding all its efficient checks as regards collection and the efforts of a well organized preventive and detective establishment, there are one or two ways in which the Government revenue may be, and I believe to some extent is, defrauded. These I will note with the best means to be employed to meet the evils complained of.

22. 1*st*.—There may be collusion between a patwari and lambardar, when the latter granting a pass to remove wood, &c., from a private forest allows the supply to be drawn from the Government jungles. This is a considerable source of danger, and can only be met by a constant inspection of the forests, and also by frequent examination of the patwari's accounts. Thus, if his district receipts fall off, and it is found that private passes from any particular quarter become numerous, a presumption arises that the Government is being defrauded. The jungles must be watched carefully, when something tangible is sure ere long to turn up and then an example can be made. Such frauds have happened, but they are, I believe, occasional, not systematic.

23. 2*ndly*.—That licenses issued in one year are made use of in a subsequent one. This did happen at first, but we have in addition to the distinguishing color of each license, which remains the same, added a distinctive mark stamped on each set when printed, so that a chaprasi, even if he cannot see the date, knows to what year a license belongs. Besides, efforts are made to collect expired licenses, and as a matter of fact 20 to 25 per cent. are so collected. This collection also affords a further check on distribution as admitting of actual comparison of foils and counterfoils. To the credit of our patwaris I would note that, so far as I can learn, on only one occasion has fraud on their part been thus detected.

24. 3*rdly*.—Another, and before all others the weakest point of the system, is that there is no check to the use by *many* of a commutation license granted for *one* household. The forest duties in this way are very easily evaded, and that they are so to a considerable extent I have no doubt. The commutation license taken out by A for his household is made use of indiscriminately by B, C and D for theirs, and, except in some few cases when the forest officials are personally acquainted with the parties, the evasion remains undetected.

25. The only way I see to do away with this is to commute with malgúzars for these "Am" licenses, and allow them to collect from their assamies. Thus, as it is evident, each household or undivided family must have a supply of grass, firewood, and such like, it follows that they must supply themselves either from malgúzari or Government jungles. The area of jungle, the usufruct of which would ordinarily meet the requirements of a given number of households, should be fixed. It would then be seen what the capabilities of meeting this each malgúzari jungle possessed. All in excess of this would represent the number of commutation licenses each malgúzar would have to take out. Nothing short of this will, I feel sure, prevent the gross abuse of this class of license.

TABLE A.

Distinguishing color.	Commutation rates.				Special rates.					
	Forest produce.	Buffaloes.	Other cattle.	Goats and sheep.	4-bullock cart load.	2-bullock cart load.	Camel load.	Buffalo or bullock load.	Donkey load.	Head load.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1.—Red	1 0 0	...	...	...	...	...	...	...	...	...
2.—Blue	...	0 4 0	0 2 0	0 0 6	...	...	...		...	...
3.—Black	...	...	...	...	...	...	...	...	...	...
Grass or firewood ...	...	...	...	...	0 8 0	0 4 0	0 2 0	0 1 0	0 0 6	0 0 2
Timber, &c.	...	...	...	...	3 0 0	1 8 0	0 12 0	0 6 0	0 3 0	0 0 9
4.—Green	...	...	...	...	...	...	...	...	...	...
10 days	...	0 0 6	0 0 3	0 0 1	...	...	...	...	...	...
20 „	...	0 1 0	0 0 6	0 0 2	...	...	...	...	...	...
Black for Khandwan and Bushanpúr.										
One week	0 0 6	...	...	...	...	...	...	...	...	...
Two weeks	0 1 0	...	...	...	...	...	...	...	...	...
Three „	0 1 6	...	...	...	...	...	...	...	...	...
One month	0 2 0	...	...	...	...	...	...	...	...	...
Two months	0 4 0	...	...	...	...	...	...	...	...	...

MR. B. POWELL.—I wish to express concurrence with what *Mr. Campbell* said about one use these sort of rules have. At any rate they disabuse people's idea that they have *a right*, and assert the right of the State. Against this particular one (Forsyth's system) the only complaint we can bring is, that while it is admirable for revenue purposes, it does *not aim in the least* at preserving the forest; and we do not know whether such a number of licenses are not issued, &c., as that the forest cannot *bear* the amounts extracted without deterioration, and that is the same point over again, which I remarked before on the "settlement" question.

I ask, is the "unreserved" forest system, with its whole purpose concentrated on facilitating removal of produce and collection of revenue, a wise one? All the people are happy *now*; but what will happen if ten years hence the man has to go out with his easily obtained license only to find that the jungle contains nothing?

DR. SCHLICH.—It is said that the unreserved forests are mere scrub jungle; is this not because they are always open to grazing and cutting? If they had rest, would they not recover or improve to a great extent?

MR. B. POWELL.—At any rate I would introduce certain protective conditions. For instance, say the license is to cut firewood. I would not let the man go and cut a bit here and a bit there over a large area. I should say—"There is a strip being cut now, you must confine yourself to a definite bit and cut it *clear* of everything that has to come down as firewood (not reserved trees of course); and you must cut close to the ground and leave a clean cut, not a jagged stump, or else the trees won't coppice."

DR. SCHLICH.—And the places must be closed for rest against grazing, or the coppice, &c., will be a failure. Suppose you close one-third for ten years; by this time so much material will be produced, that the total yield of the smaller open tract will be one far greater than that of the entire tract before it was treated properly.

COLONEL PLAYFAIR.—There is no establishment to look after the way the cutting is done. It would require to be large. It might not pay.

MR. RIBBENTROP.—At least there might be preventive rules, such as forfeiting the license right, if such precautions were not taken to cut properly as already indicated.

MR. B. POWELL.—The people in some places appear to be very ready to obey rules, and the mere issue of an order with threatened loss of license rights would be attended with some good. Anyhow, it is not safe to be satisfied with the present revenue, which nature is slowly but surely withdrawing from the struggle, and the jungle is getting worse and worse. I do not say that this *is* the case; but I say there is reason to fear it in all cases, and it is known to be so in some already.

DR. SCHLICH.—I wished to say the same thing, and especially that it appears that this system is admirably adapted to the requirements of the case in some respects; but that as a revenue of Rs. 47,000 per annum and a large number of people are dependent on these forests, we ought to lose no time in ascertaining how far the state of the jungles is affected by this mode of working, and whether it would not be advisable to close portions periodically by rotation.

MR. B. POWELL.—And also you must take care that the open portions are not abused or are abusively worked, or else your closing will only be shutting the door when the steed is stolen.

You want to supplement the closing; in short, you must lay down authoritatively a general project for treatment and closing by rotation: you must specify method of cutting for coppice, reserved trees, and such other *general* subjects; and then as to the open portion, every year, about budget time, the specific utilization of the tract to be worked that year should be determined.

SUBJECT VII.

THE METHOD OF PLANTING IN THE LOWER HILLS OF THE HIMALAYA AND SIMILAR SITUATIONS.

A paper by Mr. Craw (North-Western Provinces) was read on this subject, accompanied by a note which states that the heights assigned for Chīr, (*Pinus longifolia*) Deodar, and Walnut may appear unusually low, but they are borne out by facts. At Bareilly the *P. longifolia* has proved quite hardy and able to withstand the heat of the plains, and at Haulbagh, a low, hot place, near Almora, under 3,000 feet, Deodar and Walnut thrive and form large trees.

In proceeding to plant large tracts of bare hill country, regard should be paid to the object in view. If the intention is merely to cover the country with arboreous vegetation for appearance sake, and the supply of fuel and timber for local purposes, a different class of trees should be selected, and, under certain circumstances, a less expensive method of planting be adopted, than if the trees be required for commerce or the supply of fuel, within the shortest possible period of time.

2. The first of these objects is not one likely to largely engage the attention of this department, but from the undoubted influence trees have on husbandry, and the convenience and comfort of a rural population, the subject is one sufficiently important to invite the serious consideration of Government. Any useful suggestions connected with the planting thereof we may have to offer may therefore not be without their value.

3. Having decided on the tract of country to be planted, the boundaries must be clearly defined by well built stone pillars in remote parts, and a strong single wire fence in the immediate neighbourhood of villages, not so much to exclude cattle as to unmistakably define the limit of grazing in that direction. The neighbouring forests of the same elevation as the land to be planted should next be examined for seed. Seeds of all kinds should be gathered when perfectly ripe and dry, and such as require nursery treatment, or can only be procured in small quantities, reserved and sown in nursery plots prepared in the best parts of the proposed forest; but seeds of trees which abundantly reproduce themselves in forest tracts should be gathered in large quantities to admit of sowing broadcast somewhat thickly after a manner I shall presently describe. All seeds with thick fleshy cotyledons, like the Oak and Chesnut, succeed best sown a few together, two or three inches deep, in little prepared stations six feet apart, dug a foot and half deep and as much wide, or in nurseries. These seeds should be sown soon after ripening, and before the first winter rain falls if possible. In the process of digging the stations, a portion of the soil will get scattered about and thereby form a covering to any seeds of

Berberis, Sumach *(Rhus cotinus)*, or like low growing shrub that may be scattered thinly over the ground previous to commencing work, and which growing up quickly will shade and shelter the timber seedlings in the stations. In this way also may various trees of larger growth, as Toon, Alder, &c., with small seeds requiring light covering, be inexpensively introduced. But the tracts intended for forests must remain clear of seeds and plants until a little before the rains, when they should be fired and, where practicable, harrowed with a simple harrow made of a heavy piece of timber about three feet long, a foot wide, and three inches thick, with a double row of stout iron spikes driven into it and projecting four inches or so. Seeds of *Pinus longifolia*, *Pinus excelsa*, and *Cedrus deodara* should then be sown broadcast and covered in by quickly passing a bush harrow over the ground. The ashes from the burnt grass will form a pretty good covering to the seeds that may fall or be drawn into the holes or ruts made by the harrow, and the other seeds must take their chance, as in forests, of being washed under stones or into worm holes. In this way large tracts of country may at any little expense be covered with valuable forests. Such parts as are stony and quite unfit for timber trees should be planted with Euphorbia and Wild Vine. The following short list comprises the names of the most desirable timber trees to plant in this kind of forest at elevations ranging from 2,000 to 6,000 feet or more:—

No. 1.	*Pinus longifolia*	2,000	7,000	feet.
„ 2.	„ *excelsa*	4,000	9,000	„
„ 3.	*Cedrus deodara*	3,000	8,000	„
„ 4.	*Cedrela toona*	2,000	4,000	„
„ 5.	„ *serrata*	5,000	6,500	„
„ 6.	*Alnus nepalensis*	3,500	6,000	„
„ 7.	*Castanea* (Kumaon variety)	3,000	7,000	„
„ 8.	*Quercus incana*	4,000	8,000	„
„ 9.	*Juglans regia*	3,000	7,000	„
„ 10.	*Dalbergia sisoo*	2,000	3,500	„
„ 11.	*Melia azadarach*	2,000	4,000	„
„ 12.	*Salix babylonica*	2,000	6,500	„
„ 13.	*Rhododendron arboreum*	5,000	8,000	„
„ 14.	*Cerasus cornuta*	3,000	6,500	„
„ 15.	*Acacia decurrens*	2,000	6,000	„
„ 16.	„ *melanoxylon*	2,000	6,000	„
„ 17.	*Eucalyptus globulus*	2,500	6,000	„
„ 18.	„ *emarginata*	2,500	6,000	„
„ 19.	„ *obliqua*	2,500	6,000	„
„ 20.	„ *rostrata*	2,500	6,000	„
„ 21.	„ *sideroxylon*	2,500	6,000	„
„ 22.	*Casuarina quadrivalvis*	2,000	6,000	„
„ 23.	„ *glauca*	2,000	6,000	„
„ 24.	„ *equisetifolia*	2,000	6,000	„

4. At elevations from 2,000 to 4,000 feet Nos. 1, 15, 16, 22, 23, and 24 of the preceding list should be selected for dry, gravely, and rocky parts not planted with Euphorbia; Nos. 3, 4, 7, 9, 10, 11, 14, 17, 18, 19, 20 and 21 for good and moist parts, and for wet, marshy places Nos. 6 and 12. From 4,000 to 6,000 feet, if dry, gravely soil, plant or sow No. 1 only; marshy places Nos. 6 and 12, and all good and moist parts with the indigenous trees enumerated suitable to the several elevations of the forest if a common one; and if a better class one, the Australian Gums and Acacias may be added. Nos. 1, 2, 3, 4, 5 and 6 are

suitable for sowing broadcast; No. 12 is propagated by cuttings, and the other indigenous trees may be sown a few seeds together in stations or small nurseries, and afterwards planted out. Indeed, if the work is extensive, it will be advisable to prepare a few nursery plots for seedlings to fill in any vacancies that may occur in the broadcast sowings. For this purpose small detached pieces of level or gently sloping ground, from half an acre to an acre or more in extent, favourably situated as regards water, should be selected. Of course the soil should be good, but if not naturally so, and it is desirable to occupy it on account of proximity to water or from other circumstances, a good deep trenching, and liberal coating of well rotted manure if procurable, is all the preparation it will require.

5. In planting bare hill sides, specially with a view to commerce, we need not, unless in exceptional cases, have recourse to exotic trees. There are few timbers better suited to the general wants of the country in these parts than Chīr, Deodar, Toon and Sisoo, and they certainly cannot be accounted difficult of propagation. The first named will grow almost anywhere, but at very low elevations the timber is not particularly good, consequently useful for native purposes only, and if there is a choice of elevation, the planting of this tree should be confined to higher parts and more northerly aspects. The same remarks apply to Deodar.

6. Good heart-wood of Chīr (*Pinus longifolia*), grown at about 6,000 feet, is not the perishable article many imagine it to be. A large house at Doonagiree, roofed with Chīr and Deodar in 1867, is evidence of the durability of this timber even in outside work. The shingles are still good and likely to last several years. The extensive employment too, of Chīr in the new military buildings at Raneekhet shews that the officers of the Department Public Works think highly of it. Exotic trees, however, and more particularly Acacias and Gums, are invaluable when exceedingly rapid growth is an object, as in the case of fuel plantations. These trees are easily propagated from seed, and thrive in any ordinary soil and situation from the lowest elevations given to 6,800 feet at Doonagiree and Raneekhet. *Acacia decurrens* is also remarkable for withstanding drought and exposure in any soil, clay or gravel, and there can be no doubt would prove an excellent tree to plant in low, hot, bare hill sides, where it is difficult, nay almost impossible, to establish valuable indigenous timber. The ground once covered, indigenous trees can be planted with every chance of succeeding, and if, as has been suggested by Mr. Greig, the *Acacia* is coppiced, the ground will be effectually shaded without injuriously overshadowing the other trees.

7. For this purpose plant *Acacia decurrens* five feet apart in pits dug a foot and half deep and the same width, and the second *winter* from planting cut them off within a few inches of the ground. If the plants have grown well, a number of strong shoots will spring from each stool, and should be allowed to grow four years before being cut again. Simultaneously with the first cutting prepare nurseries of Toon, Sisso, or any other valuable indigenous tree, and when the seedlings are two years old, if strong, transplant them among the Acacias 10 feet apart. By this time the acacias will fairly cover the ground, and the next two years shade and shelter the transplants, which should now be some size and, if quick growers, able to make headway when the Acacia is cut down a

second time. Slow growing trees will occasionally require looking to, and any branches threatening to interfere with them removed; but the coppicing (after the second cutting) need not be repeated, unless the indigenous trees are in danger of being outgrown.

8. In this way I have no doubt Sâl too might be reared, but not having any experience in the cultivation of the tree, I trust the remark will be received cautiously. It will be necessary to coppice the Acacia only when it is desired to plant with it other trees difficult to establish. In every other case the tree should be allowed to attain its natural size. The timber is reputed good and useful for many purposes, and as they are easily reared other Acacias together with Gums should be planted extensively in low, hot, treeless tracts. On level land, where the plough can be used, seeds of each should be sown thinly and lightly harrowed in, but on hill sides planting from nurseries is more satisfactory, and the plants succeed best when put down rather thickly, or about four feet apart.

9. In the case of broadcast sowings of Gums and Acacias in hot situations, the land should be ploughed in autumn and the seeds sown about the time that wheat and barley are usually committed to the ground. Nurseries in such places should be prepared then too, the plants from which will be ready to remove to the forest the ensuing rains, having been transplanted into nursery lines when a few inches high in spring. But in high situations both nursery and broadcast sowings must be deferred until February or beginning of March. In nurseries sow all seeds in drills, rather than in beds broadcast; it is easier to keep the seedlings clear of weeds, and they can be more safely removed to transplant them when thickly covering the ground. Seedling Pines and Deodar in nurseries must be transplanted into nursery lines when a few inches high, and no attempt should be made to transfer these trees direct from the seed beds to the forest at any stage of their growth. Deciduous trees too should be transplanted into nursery rows, and when sufficiently strong removed to the forest. Weak growing trees will benefit by a second transplanting and another year of the nursery, but generally one removal will suffice. Young plants taken from under old trees in the forest and planted in the open country rarely succeed, and this plan of supplementing nurseries and broadcast sowings is not one I would recommend.

10. Regard should be had to the season of transplanting particular trees. I would strongly advise all engaged in heavy planting operations not to attempt planting Evergreen trees during the winter or spring months, for to ensure success the plants must be constantly and carefully watered for a time, whereas by planting during the rains the expense of watering is avoided. Winter however is the proper season to plant all deciduous trees, though, should circumstances require it, they also may be safely planted during the rains. This division has the advantage too of spreading the work over many months, thereby ensuring its being done carefully, not hurriedly as might possibly be the case if labor is scarce, and the planting of many thousands of trees is crowded into the few months of winter or the rainy season.

11. In conclusion, I would suggest resorting largely to broadcast sowings of Pine and Deodar whenever practicable and desirable. Seeds of both trees are easily procured, and the work of committing them to the ground not expensive. But in situations where these trees will not

grow, or growing be comparatively valueless, I would plant Acacias, Gums, Casuarinas, Toon, Sisoo, &c., separately or together as already described, selecting for the several Gums, which are truly magnificent and valuable trees, the best portions of the forest as regards soil and moisture. Bare, shaly, and steep portions will do for the Acacias and Casuarinas, and I would distribute the various indigenous trees suited to the elevation generally among the exotics, avoiding of course for all any portions unmistakably bad. These, if planted they must be, I would plant with Euphorbia and the Wild Vine (*Vitis lanata*) commonly met with in Kumaon. The Vine cuttings should consist of well ripened wood of the preceding year's growth, and be taken from the tree during winter and either planted out at once or into nursery beds of light sandy soil. In the latter case the cuttings may consist of a single eye or bud only, with about two inches of wood, and should be placed about two inches deep and carefully watered until the young shoot appears above ground. In the former they will require to be a foot or 15 inches long. The plants from the nursery will be ready to transplant the following winter.

MR. GREIG communicated his remarks:—

I do not at all agree with Mr. Craw about broadcast sowings; such may do to fill up small glades inside a forest, but for covering bare hill sides I should recommend very strong nursery-raised plants that have been transplanted at least twice; the young tree would have great disadvantages to contend with—no shade and want of moisture—and should be as strong in root growth *as possible*.

For bare slopes at an elevation of from 2,000 to 4,000 feet, I am strongly in favor of the *Acacia decurrens*, cultivated as recommended by Mr. Craw in his para. 7. Once get the ground shaded you can then plant whatever trees are considered best, and the *Acacia* coppice will help to make them grow straight in the stem.

Connected with this subject, a paper by Mr. Narayan Anand, Sub-Assistant Conservator of Forests, Bombay, was read:—

On the best method of replanting stony bare hills in the Deccan.

I believe every careful observer will admit that the present denuded hills in the Deccan were at one time clad with forest, all of which was cut down imprudently and lavishly by the people without any thought of the consequences which were to follow. No doubt since their denudation so many years have passed, that the present generation does not remember whether they were formerly covered with valuable kinds of trees or not; but where the time of denudation is yet in the recollection of old people, they bitterly lament the loss of the beautiful forests which clothed their mountains. In consequence of the wholesale destruction of forest on the sides and slopes of the hills the soil has become barren,

the vegetable earth being washed away by the rain. This has resulted in the diminution of springs and rivulets, and the occurrence of impetuous torrents owing to the absence of trees to regulate the flow of the rain-water which falls on the hill sides. The rivers in the Deccan are very remarkable for their shallowness; some of them into which the torrents discharge themselves overflow during the monsoon, devastating the surrounding country. Some hills have become so barren that in my opinion it would be literally a waste of time and money to attempt to reclothe them by annual sowings, as we could hardly hope for success. Although such consequences have resulted from the wholesale destruction of forests, and will result where it is allowed, yet no stop has yet been put to it, because it is not yet properly understood that they arise from denudation. The necessity of forest conservation must first be thoroughly comprehended. In consequence of the actual dearth of good wood, people have commenced to build their mud-roofed houses with inferior kinds of wood—Limb, Bakana, Shere, Babúl, &c., and have substituted for firewood cow-dung cakes, which form a very good manure and, therefore, ought rather to be used in manuring the fields.

2. It is generally believed that forests influence the fall of rain and keep the temperature cool. It is a fact, the existence of which no one would doubt, that those districts which have their western mountains well covered with trees enjoy the largest share of rain.

MR. B. POWELL.—It would be ungracious to apply criticism to this interesting paper, the first we have ever had from a native Forest officer; but it must be stated that the Western Ghâts are close to the sea and catch the full fury of the monsoon on their western heights and slopes, so that we cannot say with any precision what the effect of cutting all the forests would be. It might lessen the rainfall and cause more vapour to pass uncondensed on to the east, but the close proximity to the sea would throw out calculations of this sort.

It is therefore on account of rain, as well as for other consequences mentioned above, that the destructive system of denuding hills of the forests growing thereon must be strictly prohibited, and measures adopted to reclothe those that have been already denuded. Let us now proceed to discuss the best method for replanting the latter.

3. Supposing that if the denuded hills be yearly sown broadcast with seeds suitable to the soil, and grazing on them be stopped for a few years, they will in all probability in course of time be covered with forests somewhat inferior to those which formerly existed on them; different kinds of seeds were strewn over several tracts in the Akola and Saugaumair talúkas of this collectorate. Although these operations were carried on successively for two or three years, and in some cases repeated over the same tracts, yet not a single seedling reared up from seeds sown now exists. The seed sown no doubt germinated in some places, but the young seedlings were annually scorched immedialy after the close of the monsoon, their roots being unable to penetrate into hard ground. Perceiving the result of broadcast

sowings, it occurred to me in 1872 that if seeds were dibbled in, our efforts would be attended with better results, and with this object I had ordered in the monsoon of that year to excavate holes and sow seeds into them. No doubt it was a success as far as germination was concerned, but the young seedlings being unable to resist the baneful effects of heat died after the monsoon. They required watering, which could not be given to them.

4. As both the methods described above have proved ineffectual in growing trees on stony bare hills, the only possible one now left in my opinion is first to rear up seedlings in nurseries, and, when they are sufficiently old and do not require watering, to transplant them out on hills intended to be clad with them. For this purpose suitable sites as near these hills as possible, and in the close vicinity of water, should be selected, their entire ground ploughed or otherwise loosened and worked up to a considerable depth, and different kinds of seeds sown separately in straight lines a foot apart. These lines should be from two to three feet apart from one another. The object of loosening the entire ground is to admit air, which is a bad conductor of heat, and thereby to save young seedlings from being injured by the latter. They should be allowed to grow in the same nurseries for a period of two or three years, or for a greater period, if necessary, in the case of slow growing trees, and watered liberally after the monsoon; also during long intervals of rain. The preparation of ground for sowing *Teak* should be effected in accordance with Mr. Dalzell's instructions, but the seed, instead of sowing it two inches apart, should be sown 12 inches apart, as the seedlings are to remain for more than three years in the very places they first come up. For the sake of easy reference I quote below some of his rules on the subject.

"*3rd.*—The best ground should be selected and prepared in the usual manner for ordinary crops, then covered with dry vegetable matter and burnt.

"*4th.*—The teak seeds after being steeped in warm water for 24 to 30 hours (which much facilitates their germination) should be sown in the middle of April two inches apart.

"*5th.*—They should be covered with a quarter of an inch of soil, and the ground then covered with straw.

"*6th.*—Liberal watering should be given, and care taken that the ground is never allowed to get dry.

"*7th.*—Most of the seeds will germinate in from four to eight weeks, by which time the periodical rains and cloudy weather will have set in.

"*8th.*—As soon as the seedlings appear above the ground, the straw should be removed."

5. After two or three years most of the kinds of seedlings will not require watering, and therefore at this age, after the first showers of rain have fallen, they should be transplanted out on hills where they may be expected to grow permanently. To receive these plants, holes, two feet deep and having a diameter of one foot, should be excavated, the whole of the soil taken out, pulverized, cleaned of grass, roots, &c., and returned lightly into them. In places where the soil is rocky or of Moorum, it would be desirable, for the reasons stated by Dr. Gibson, to

have the holes prepared a year before the transplanting is to take place. The advantage gained from this is as follows in the words of Dr. Gibson :—"The rain of one season lodges in the holes, and by tending to decompose and break up the strata at the bottom of the pits makes it the less necessary to dig these of any great depth, because the roots by the time they reach the lower strata will have gathered strength sufficient to penetrate into them when previously softened by a year's rain."

6. No general estimates of the expenses either of preparing a nursery of one acre and watering it two or three years, or of transplanting one acre of stony ground, can be formed, as in the case of the former it will everywhere depend on the price of labor, the nature of the ground, and the distance the river, tank, or well, with the water of which the nursery is to be watered, is situated from it; while in the case of the latter, it will depend on the first two causes; also on the number of holes that will be excavated in the acre transplanted. I would, therefore, propose that at first experiments be made on a very limited scale in one or two places in each collectorate, and if the system be found successful it be carried on extensively.

MR. MCL. CAMPBELL.—In the annual report for 1872-73 Major Peyton mentions successful experiments in *reboisement* of barren hills in, I think, the Dharwar District (South Bombay). He planted a variety of blackwood, called "Chinese Blackwood" (*Dalbergia sinensis* I think it was called). He found it grew on most unpromising places. It spreads by suckers from the roots, and forms a mat-work of vegetation over the hill side. It is not expected that the tree will yield timber, but it is looked to for firewood and even for small wood required in building huts.

MR. KURZ.—The limestone hills of Southern Java are covered by different species of fig trees, especially *Ficus karets* and *F. nitida*, in places where no surface-soil previously existed. Here the trees grow to a considerable size, covering the sides and ridges of the rock with a complete net-work of roots penetrating into the crevices. Numerous low herbs (chiefly Peppers) spring up between the roots, preparing soil for a more luxuriant growth hereafter.

MR. SHUTTLEWORTH's paper on the same subject was then read :—

The barren and desolate condition of the lower hills of the North-west Himalayas no doubt offers a parallel case to the present state of the hills in the Deccan, which were once—and not so very many years ago, as the traditions of the people and history of the country tell us—covered with trees and vegetation, which gave increased fertility to the valleys of which they constitute the drainage basins.

The axe of the "Koomri" cultivator, and the improvident manner in which trees are continually cut down by the people to supply their wants, have quite changed the character and appearance of the Deccan hills, and have converted them into stony unproductive wildernesses.

In the rains a small crop of very inferior and low growing grass sprouts in places where the rock does not appear on the surface, but it offers very poor and indifferent grazing to cattle and soon dries up and disappears. Instead of a clothing of verdure meeting the eye, rocks and stones are to be seen on all sides. Here and there under the shelter of a boulder, which has acted as a breakwater against the rush of the rainfall and saved the soil from being washed away, Euphorbia bushes and other scrubby growth may be seen. But the general appearance of the hills is barren in the extreme, having their sides scored over by deep gullies and water-courses, which carry off the rain as soon as it reaches the ground to fill rivers with short lived torrents without allowing the water to percolate into the ground.

The bad effects of the scarcity of wood are visible in the Deccan, more especially its eastern districts; the houses instead of having sloping tiled roofs as in the Konkan,* and better wooded parts of the presidency, with an appearance of comfort and cleanliness, have flat mud roofs looking squalid and cheerless, while the people are compelled to employ cow-dung as a substitute for wood fuel in cooking their food.

The advantages of having the mountain and hill slopes of a country clothed with trees, both on meteorological and economic considerations, have been so often discussed and so universally acknowledged that little need be now said on those subjects, and it remains only to consider the best method, both in a financial and practical point of view, of replanting with trees barren and denuded hill sides.

It should be remembered that it is only in very extreme cases that we can afford to replant hill slopes at utter disregard of cost our aim must be to regulate expenditure, so that the forests reproduced may return interest on the money spent on their restoration.

Several methods of planting commend themselves to favorable notice, but the character and circumstances of the ground to be planted over have to be considered before determining on the system to be adopted.

The species of trees to be cultivated are not difficult of selection. One has but to look around and see what kinds grow best in the immediate neighbourhood, accommodating themselves to and thriving in the surrounding soil and climate. A great deal of money is often wasted in endeavouring to introduce foreign woods. Plantations of Australian and European varieties are attempted at a large cost without considering whether there is a really fair chance of their succeeding, of their producing timber, or repaying the outlay incurred upon them. The humbler natural growth of the country is despised, although indigenous trees are in reality as well, if not better, suited to supply local wants, and can without doubt be produced at smaller cost.

* On the west side of the Ghâts. The paper refers to the east slopes and to the lower hills in the Eastern Bombay Districts.

In this presidency also we have to bear in mind that iron has in a great measure usurped the place of wood in naval architecture and in construction of large public buildings, bridges, and other important structural works, and therefore when forming plantations, the object is not so much to grow lofty trees yielding superior timber as it is to produce wood best adapted to meet local requirements.

MR. McL. CAMPBELL.—Even where large timber is required, Burmah timber, with which we shall never be able to compete, is always procurable at reasonable prices in and near Bombay.

Having determined the species to be grown, the next consideration is how to plant them. The first requisite for success is *protection*, and when this has been ensured then the next great adjunct is shade. It is useless to attempt covering the ground with seedlings if cattle and other intruders are to have ingress, and tread down and destroy all the plants, and therefore the first thing to think about is *an efficient fence*; possibly in wild and unfrequented districts this may not be of great importance, but I would premise that my remarks bear special reference to densely populated districts of the western presidency, specially the Deccan. Living hedges recommend themselves as they are remunerative, *i. e.*, they pay in after years by the value of their cuttings, loppings, pods, &c., the money originally laid upon them. The Chilhar (*Cæsalpiuia sepiaria*) affords a most efficient barrier as the famous Aramboli lines in Mysore prove. The Shèr (*Euphorbia tiraculli*) grows into a very good hedge, and at the same time a paying one, its charcoal being used in the manufacture of blasting powder, and its rafters from their lightness and toughness being useful for native roofing purposes and for drainage or cross battens for tiles to rest upon. Babool, Bamboo, the *Agave Americana*, and other species are used with advantage for making enclosures; but the great objection to living hedges is that they take time to grow, and months pass before they are sufficiently developed to answer the purposes intended.

Experience in plantations made in the northern forests of Bombay has shown that wire is an inexpensive, substantial, and durable material to employ for enclosures. Old telegraph wire supported by teak posts forms a very efficient fence. If the posts are taken from crooked and unsound trees in the nearest forest the cost is not great, while at the same time the forest is benefitted by their removal.*

The advantage of a fence of this nature is that it can be removed elsewhere for use after it has done duty in one or more localities, and it becomes effective the moment it is erected. After the fence has been put up, a small ridge should be heaped up parallel to it on its inner side and seeds of hedging plants sown on the top, and when their growth is strong enough to be protecting the wire fencing can be shifted.

When a hill side is prepared for "koomri" all the trees growing upon it are cut down without reserve, and the wood after drying where it has fallen is burned and seeds are sown in the ashes, a crop of very indifferent cereal being produced therefrom, which in a measure prevents the

* The Conference Report of 1871-72 contains much information about fencing.—ED.

soil being carried down the slope by the rains. The following season a second growth of jungle appears, roots and tubers buried well under the surface, and thus having escaped the effects of the fire throw up new shoots, herbaceous plants spring up, seeds that were under ground germinate and grow, and in a few years, if they are permitted to do so, overtop and suffocate the humbler growth, and thus after a time the hill side is covered with the same species that composed its original forest without any artificial assistance.

MR. B. POWELL.—I doubt the *same species* being always produced: there is a tendency to deterioration, good trees giving way to worthless species.

But where under the continuous operation of "koomri" in successive years the roots in the ground have lost their vitality and the soil has been washed away, the hill becoming an unproductive waste, nature must be assisted by artificial planting before the ground can be restocked with trees.

The system of growing seedlings in a nursery, and afterwards putting them out in the hill side, is undoubtedly a successful method of planting, but at the same time it is a costly process; possibly it might with advantage be adopted in connection with limited areas under favorable conditions of soil, &c., but when a very large extent of country has to be planted over, which has been bare for years with its surface caked to the consistency of rock under the influence of rain, wind and sun, refusing to absorb moisture and quite oblivious of shade, a less expensive plan is desirable.

MR. B. POWELL.—It is often necessary to use pits and transplant. In some cases nothing else will succeed.

In the first place the ground should be enclosed and then trenches cut across the slope of the hill to arrest the wash of water, gullies, and water-courses being dammed by having rocks and boulders rolled with them so that they may catch and retain silt and off scourings. After this seeds of fast and slow growing trees of inferior and good woods intermixed should be broadcasted over the ground. Provided the seed be good, the greater portion will germinate: many seedlings also will die, but a few will survive; hardy plants and stunted bushes will make their appearance, annually increasing the shade and counteracting the effects of winds and rain; soil will be formed by the falling and decaying leaves, and the soil loosened and improved: then we may hope to see a good tree growth established. To reclothe barren hill slopes with trees is, however, a work of time. The planter must not, therefore, be disappointed if his first efforts are not very encouraging, and must not lose heart if a dense crop of seedlings overspreading the ground is not the result of his first year's sowings.

MR. B. POWELL.—I am glad to see the proper stress laid on protection. You *must* keep out cattle from these places. You will see that in every paper this is insisted on: it was also the first step taken in the treatment of the Toulon hills, which I shall presently describe.

In such hills as the Pubbi (crossing the grand trunk road a few miles south of the Jhelum river) and those of Ajmir, the authorities requiring us to do *reboisement* work must first of all make up their mind that the work is of such importance that they will *insist* in keeping cattle out. It is no use trying to do this piecemeal. You must take up a fairly large area, and go over it all so as to be able to get the benefit of *rest*, and the slight improvements which unaided nature will effect before you begin to plant. It is not enough to say keep out grazing of the 200 acres you mean to do at a time: that is a perfect mistake. Moreover, until you give the place a fair trial you do not know how far it will restore itself: it may do so to a degree that will help very considerably and facilitate the work of *reboisement*. I would have every hopes of great success in Ajmir if only the authorities would go in for a whole-hearted support of the work, and say—"It may cause some difficulty to turn the cattle off this whole ridge, but the advantages of restoring it are *so great* that the thing must be done."

I hope this will receive attention. You must take up in Ajmir a good large extent all along the hill from the top to the bottom, and keep cattle out for at least 15 years. No piecemeal or half-and-half measures will succeed.

Then due care must be taken to encourage every blade of vegetation before the sowing or planting in pits is commenced. At first I would sow freely all sorts of common seeds that I could get, trees and everything else, just before the rains, and aid the work by cutting trenches, &c., as elsewhere described. Mr. Craw calls attention to Euphorbia and to a Wild *Vine* (*Vitis lanata*), cuttings of which can be easily got by post. Then we should find out about the Chinese *dalbergia* from Major Peyton, and attend also to *Acacia decurrens*. The hills are Vindhyan, of hard sandstone, and we have naturally *Acacias*, *Boswellia*, *&c.* After a time *Anogeissus and Terminalia tomentosa* would be got to grow there.

I will now with your permission read you an account of the *reboisement* of a barren and desolate range of hills (magnesian limestone) called Mount Pharos (Faron) behind the town and port of Toulon. It is entirely derived from an article in the *Revue des Eaux et Forêts* (February 1873) by M. G. E. VINCENT.

Toulon is in the 3° 25′ 26″ parallel of longitude and 43° 71′ 9″ latitude. Unfortunately I can nowhere find the rainfall recorded.

A mountain range called Pharos (Faron) protects the town from the winds of the north. Its crest does not exceed 580 metres (1,700 feet) in height, but looks imposing because it rises straight from the sea-level without intermediate slopes.

The crest is three kilometres (two miles) long, extending from east to west.

"In the morning and evening," writes M. Vincent, "when the sun "shines with oblique rays on the mountain side, the blue shadows that "lengthen in its deep ravines cut up the mass and give it a magni-"ficent appearance; but at mid-day all the inequalities of the surface "fall uniformly under the direct glare and are not appreciated, and it is "impossible to see anything sadder and more fearfully desolate than the "calcareous mass, whose rocks almost white reflect the light and heat "with the greatest violence."

Mount Pharos forms the chief point of the military defences of Toulon.

On the plateau, and the higher portions of the south slopes, lie the communal lands of Toulon, which contain not less than 364 hectares 39-40 ares, (about 911 acres). At the east and west extremities there are two military cantonments, together occupying about 67*h*. 59-80*a*. (about 168 acres). These altogether give the area of the mountain head as 431*h*. 99-20*a*. (1,080 acres).

It is not correct to call the whole a communal domain as is usually done, for all the lower slopes (*contreforts*), which are slightly covered with vegetation, belong to private owners. The communal portion, which commences at the almost impassable precipices half way up, consists almost entirely of bare and abrupt rocky masses and of stony beds on which 20 years ago not a blade of grass could be found.

The Toulon people always cherished the idea of reforesting the barren summits, but there seemed but a poor chance of realizing it, for goats and sheep had nibbled down to the root the last remnants of grass, and the harbour roads were obstructed by the earth and stones carried down by the mountain torrents. Without exaggeration we may say that only the bare skeleton of the mountain remained.

Tradition, however, asserts that once a fine high forest covered the mountain, and the beams of the mayor's residence, built in A. D. 1656, were made of larch cut on the crests of Mount Pharos.

It is probable, however, that the timber was *Pinus silvestris*, of which some remains still exists in the north slopes. All attempts at raising larch (*Meleze, P. laricio*) have failed. The heat reverberated from the arid rocks caused the young plants to die out.

It seems probable that the best tree to cover the mountain is the *Pinus halepensis*, and perhaps the *Quercus ilex* (Chêne vert); but it is many years since these hardy species, of which hardly a remnant exists on the most inaccessible parts of the range, have been exterminated.

Ancient documents prove that the destruction of the forests dates three centuries back. Not only so but on the lower slopes (contreforts), "where our forefathers with a perseverance that one admires to this day had cultivated the vine and the olive, by retaining the soil with rough stone walls or embankments," the aspect is entirely changed.

The waters no longer retarded by the vegetation on the heights come down in torrents across these cultivated terraces, formed with so much labor, and carry with them the soil to such an extent that now in place of the smiling estates which J. Vernet chose as the model for his picture "La Rade de Toulon," one can now only find in the higher parts long lines of stone walls partly broken down, and plains abandoned and covered with a miserable scrub of Broom (*Genista*), the Juniper, and the Kermes Oak (*Quercus laccifera*), varied by a few stunted Holm Oaks (*Q. ilex*) and *Pinus haleppensis;* and this only shows that if we wish to preserve the lower slopes and plains in a state of agricutural prosperity, we must preserve the forest in the heights above.

Such was the condition of the mountain previous to 1850, and it was growing worse day by day.

Still the people of Toulon, when success seemed almost chimerical, kept on dreaming that the mountain would be restored and covered with forest.

M. Robert, "Pharmacien" of the Marine Department and Director of the Naval School of Medicine, had carefully studied the mountain.

He discovered some parts that were less utterly ruined than the rest. Some plants, twenty times browsed down to the roots by goats, whose roots still showed in spring some faint indications of vitality, made him suspect that he might find a little soil in places under the bed of rolling stones.

The idea of a complete *reboisement* was not yet entertained, and at first M. Robert only thought be could produce at least some clumps of trees to moderate the fierce reverberation of the heat from the burning rocks.

In 1850 he obtained a grant of 600 francs from the Municipal Council, and with this small sum he set to work courageously.

Fortunately the council decided at once to prohibit the pasturing of goats,* and this step proved of the greatest importance.

The council further encouraged the undertaking, and when M. Robert resigned the service M. Auzende followed him, and succeeded so far as to grow some clumps of pines, which from their greater age still mark out the site of the earlier efforts.

In 1854 M. Vincent (author of the paper) was appointed "Garde-general." He got the whole mountain placed under forest law, as *the only means (N. B.) of protecting it against trespass and forest offences, and of giving the work a systematic and efficacious direction.* Some difficulties were, however, experienced in effecting the application of the law in its entirety, and it was not till 1864 that it was finally accomplished.

During this first period of the attempts at reforesting, the Municipal Council had expended in all 15,050 francs (£602).†

The result of the attempt according to the plan first entertained was, that scattered clumps of trees were produced on level spots, on the confines of the range, at the foot of great rocky scarps, and in short everywhere where a little soil remained.

* This should be remarked: the first step in any *reboisement* work is to stop grazing, especially in this country, of goats and camels.

† About £8 12*s*. per acre.

Belts of trees, square plots, and single holes had been planted up, the total area of which may be estimated at 30 hectares (70 acres). A new system was then commenced.

The state granted 2,800 francs and 1,000 francs in grain, and the town an annual contribution of 1,000 francs.

Since 1866 the "Department" added 1,000 francs to encourage the work.

Under the new system they could not search for occasional spots which gave promise of fertility. It was necessary to take the whole mountain in hand, beginning at one end, and pushing on the work from plot to plot, by an annual work of from 15 to 20 hectares (38 to 50 acres), and this without allowing the difficulties of the task to oppose progress.

The worst portions were the slopes which descend towards Toulon: these slopes have an inclination of from forty to fifty in a hundred, and were often almost vertical.

Here it was decided to begin; firstly, because the evil to be repaired was greater; secondly, because it was necessary to protect as far as possible the estates below from the damage caused by floods in the torrents; and lastly, in order to give the town itself the benefit of the restoration as soon as possible.

The level spots which give vegetation a better chance were left to the last, for they were less in danger from the violent action of rain torrents.

It was found that under the surface-bed of rounded pebbles and loose stones, but often at depth of 0·80 metre (about 3 feet), some elements suitable for vegetation, such as sand, gravel, clay and even a little vegetable mould, would exist: this had to be reached.

The nature of the soil too did not admit of forming square plots or horizontal belts, but "potets" or holes were made of 0·80—1·0 metre (about 3—3¼ feet) square. Care was necessary to select places where the rock presented fissures into which the roots of the plants would push their way. The workmen also had to study the mountain attentively, and it was only after several months' experience that they got to know the places (or were able to test them by soundings) where holes should be sunk. Often they came on horizontal beds of rock, and the pit that was begun had to be abandoned.

The lines of pits always commenced at the *top* of the slopes, because rocks and stones are so easily carried down from the scarped sides of the hill, that the holes made below would become filled up by the débris from the work above.

It was found impossible to make the holes at perfectly regular intervals, because of the masses of rock which were encountered almost everywhere.

Effort was, however, made to keep them as regular as possible, and as well to make them about 3—5 metres apart (about 9¾ feet—16 feet). A less distance would have been advantageous so as to gain a cover sooner. The distance was, therefore, diminished wherever the bed of stones was less in thickness, so that they could get more easily at the bed of soil from which it was that they sought for below.

As it was the workmen had often to remove masses of stone with the lever and crowbar, and the material removed from each pit often

The waters no longer retarded by the vegetation on the heights come down in torrents across these cultivated terraces, formed with so much labor, and carry with them the soil to such an extent that now in place of the smiling estates which J. Vernet chose as the model for his picture "La Rade de Toulon," one can now only find in the higher parts long lines of stone walls partly broken down, and plains abandoned and covered with a miserable scrub of Broom (*Genista*), the Juniper, and the Kermes Oak (*Quercus laccifera*), varied by a few stunted Holm Oaks (*Q. ilex*) and *Pinus haleppensis;* and this only shows that if we wish to preserve the lower slopes and plains in a state of agricutural prosperity, we must preserve the forest in the heights above.

Such was the condition of the mountain previous to 1850, and it was growing worse day by day.

Still the people of Toulon, when success seemed almost chimerical, kept on dreaming that the mountain would be restored and covered with forest.

M. Robert, "Pharmacien" of the Marine Department and Director of the Naval School of Medicine, had carefully studied the mountain.

He discovered some parts that were less utterly ruined than the rest. Some plants, twenty times browsed down to the roots by goats, whose roots still showed in spring some faint indications of vitality, made him suspect that he might find a little soil in places under the bed of rolling stones.

The idea of a complete *reboisement* was not yet entertained, and at first M. Robert only thought he could produce at least some clumps of trees to moderate the fierce reverberation of the heat from the burning rocks.

In 1850 he obtained a grant of 600 francs from the Municipal Council, and with this small sum he set to work courageously.

Fortunately the council decided at once to prohibit the pasturing of goats,* and this step proved of the greatest importance.

The council further encouraged the undertaking, and when M. Robert resigned the service M. Auzende followed him, and succeeded so far as to grow some clumps of pines, which from their greater age still mark out the site of the earlier efforts.

In 1854 M. Vincent (author of the paper) was appointed "Garde-general." He got the whole mountain placed under forest law, as *the only means (N. B.) of protecting it against trespass and forest offences, and of giving the work a systematic and efficacious direction.* Some difficulties were, however, experienced in effecting the application of the law in its entirety, and it was not till 1864 that it was finally accomplished.

During this first period of the attempts at reforesting, the Municipal Council had expended in all 15,050 francs (£602).†

The result of the attempt according to the plan first entertained was, that scattered clumps of trees were produced on level spots, on the confines of the range, at the foot of great rocky scarps, and in short everywhere where a little soil remained.

* This should be remarked: the first step in any *reboisement* work is to stop grazing, especially in this country, of goats and camels.

† About £8 12*s.* per acre.

Belts of trees, square plots, and single holes had been planted up, the total area of which may be estimated at 30 hectares (70 acres). A new system was then commenced.

The state granted 2,800 francs and 1,000 francs in grain, and the town an annual contribution of 1,000 francs.

Since 1866 the "Department" added 1,000 francs to encourage the work.

Under the new system they could not search for occasional spots which gave promise of fertility. It was necessary to take the whole mountain in hand, beginning at one end, and pushing on the work from plot to plot, by an annual work of from 15 to 20 hectares (38 to 50 acres), and this without allowing the difficulties of the task to oppose progress.

The worst portions were the slopes which descend towards Toulon: these slopes have an inclination of from forty to fifty in a hundred, and were often almost vertical.

Here it was decided to begin; firstly, because the evil to be repaired was greater; secondly, because it was necessary to protect as far as possible the estates below from the damage caused by floods in the torrents; and lastly, in order to give the town itself the benefit of the restoration as soon as possible.

The level spots which give vegetation a better chance were left to the last, for they were less in danger from the violent action of rain torrents.

It was found that under the surface-bed of rounded pebbles and loose stones, but often at depth of 0·80 metre (about 3 feet), some elements suitable for vegetation, such as sand, gravel, clay and even a little vegetable mould, would exist: this had to be reached.

The nature of the soil too did not admit of forming square plots or horizontal belts, but "potets" or holes were made of 0·80—1·0 metre (about 3—3¼ feet) square. Care was necessary to select places where the rock presented fissures into which the roots of the plants would push their way. The workmen also had to study the mountain attentively, and it was only after several months' experience that they got to know the places (or were able to test them by soundings) where holes should be sunk. Often they came on horizontal beds of rock, and the pit that was begun had to be abandoned.

The lines of pits always commenced at the *top* of the slopes, because rocks and stones are so easily carried down from the scarped sides of the hill, that the holes made below would become filled up by the débris from the work above.

It was found impossible to make the holes at perfectly regular intervals, because of the masses of rock which were encountered almost everywhere.

Effort was, however, made to keep them as regular as possible, and as well to make them about 3—5 metres apart (about 9¾ feet—16 feet). A less distance would have been advantageous so as to gain a cover sooner. The distance was, therefore, diminished wherever the bed of stones was less in thickness, so that they could get more easily at the bed of soil from which it was that they sought for below.

As it was the workmen had often to remove masses of stone with the lever and crowbar, and the material removed from each pit often

amounted to a cubic metre of stones, so that it required strong bodied and able workmen to turn out six or seven holes in a day, each.

The expense of digging also compelled the retention of the greater distance in many cases.

The distance, the author goes on to remark, is absolutely sufficient, though the show of verdure will not be made so soon. In making the holes the workman throws aside all the blocks of stones, pebbles, &c., but takes care to preserve all the gravel, sand, and earth he discovers. When he has got together a sufficient quantity, he puts it into the bottom of his "potet," which is then ready to receive the seed.

They took the roughest and hardiest trees at first to reforest the dry and poor soil, and had good success with *Pinus pinaster* and *P. maritima*, as these also grow fast. Sometimes they put in the same hole a few *Quercus ilex*, which though a slow grower strikes a long deep and vigorous root and grows under the shade of the pines. Sometimes *Acacia* was tried (what species is not stated).

The author then goes on to remark that this is a *military* place. The pines can only be looked on as a preliminary growth to be gradually replaced by deciduous trees capable of coppicing in case of destruction by military operations, war, &c.

They tried also *Cedrus*, *Ailanthus*, the Carabbean *Ceratonia*, the Judas tree and *Encalytpus*, but the result confirmed the first idea that the *indigenous* and *hardy species* were to be preferred.

Besides the trees they sowed all sorts of other seed that would get up any kind of vegetation about the surface of the mountain, with a view of getting a little vegetable mould formed.

They used up all the spare seeds from the town gardens, &c., and sowed them about broadcast, and thus filled numerous crevices and fissures with vegetation.

Thus, says the author, a number of strange plants are to the astonishment of botanical writers found on Mount Pharos quite unknown to the local flora.

After numerous trials they found that sowing *in situ* was the best method, as it was excessively difficult to succeed with transplants from beds (repiquements).

But whenever they found a little more soil than usual, they extended the size of the "potet" to double or treble, and thus made little scattered nurseries from which they could take transplants for such holes as had soil deep enough to give them a chance.

The author then remarks on his laborers, and observes that it was of first rate importance to get the same men year after year if possible, as they get very skilful in making up the "potets."

They not only sowed in spring when there was gentle rain and late heat, but also in autumn. The latter sowing gave good results, because the plants had time to grow a little strong and robust against the heat of the next following summer; but of course the winter was to be feared. Here too birds, slugs, and field-mice were their enemies. They had often to protect the beds with branches.

The spring sowings also succeeded if the plants could get on sufficiently to stand the summer heat; so they sowed at both seasons in order to get the greatest number of chances, and to be able to repair at one season the failures of the preceding one, without waiting a whole year.

In the first year these plants got up to 8 or 10 centimetres (3½-4 inch, and in the second to 15 or 20 (7—8 inch). By the third year the roots had got a good hold on the ungrateful soil, and the plants pushed upward to 30 or 40 centimetres (14—16 inch). But it was not till the fourth or fifth year that the plants emerged above the edge of the "potet," and some years still before the verdure was visible from the town below.

Then a new enemy came—a species of caterpillar—the "chenille processionaire." In the first months of spring, before the warmth set the dangerous colony in motion, they had to remove the nests or cocoons formed during the year and destroy them.

They found that pruning and lopping the trees was bad: the lower branches kept the soil moist.

"On lifting up the lower boughs one perceived," says the author, a thick bed of plants under the protecting shade, a collection of dead leaves, and a certain coolness and moisture." Pruning is replaced by light thinnings on points where the young plants (brins) are too thick.

It is asserted also that the total stoppage of grazing had allowed in some places the remains of the natural vegetation to sprout out again.

In 1868 some pines had already cones, and there were a few natural seedlings on the ground, and on an inspection visit good seed was sown, which has produced trees now three years old.

They have *reboised* 195 hectares (about 487½ acres) at a cost of 49,410 francs, average cost being 253 francs per hectare (£10-3 or Rs. 101-8 per hectare, say Rs. 46 per acre).

The remaining 170 hectares will cost 43,000 francs. They expect the business to pay, even out of the wood, but of course the other benefits are still greater.

MR. RIBBENTROP.—I noticed in a German newspaper that the *reboisement* of some barren hills (I believe limestone) in the Austrian Empire bordering on the Adriatic had been carried out in a similar manner with *Pinus Austriaca*, *P. sylvestris*, *P. maritima* and other species. Models illustrating the process were exhibited at Vienna by the Austrian Forest Department. The planting was effected upon earth heaped up between the stones. I think effort should be made to procure a full account of the work from Europe.

Immediately connected with the foregoing papers, which deal especially with *hill* tracts, the following papers were read:—"On the best methods of replanting rainless and arid 'Rakhs' and Wastes," by A. E. WILD, Punjab.

With such experience as we alone have in the Punjab, I feel reluctant in advancing a decided opinion on any of the methods, which

I hereafter more fully explain, of replanting such difficult tracts as rainless and arid wastes. And I feel sure you will all agree with me that in the present unsatisfactory state of development of forest science in India, the subject which I now bring forward for discussion is one of extreme uncertainty, which requires universal ideas and opinions before we can say without doubt that under such conditions this or that method of planting or sowing should be adopted.

I hope, therefore, that as this paper must through my want of experience necessarily be short, you will take up the discussion with energy, so that we may at least be able to say that up to the present time and so far as our experience teaches us, such and such methods should undoubtedly be employed on land of the nature I am now treating of.

The importance of the subject too will I am sure be apparent to all, when I mention the fact that in the Punjab alone we have thousands of square miles of rakh land, almost one-half of which, as far as I am conversant with such land, and I believe I had charge of some of the better class, is destitute of wood, and can be put down as arid and waste.

Before bringing forward the methods I propose, the merits of which I leave to you to discuss, let us take a glance at the experience that we have already gained on the subject in the Punjab.

In the rakhs of the Punjab I have noticed several attempts by district officers to improve their condition, but in every case, I think, I may say without success. The method adopted here was, or at least I should say it was from the present appearance of the soil, sowing in shallow trenches and plough furrows 20 or even more feet apart.

I am not aware what kinds of seed were sown, nor what measures were taken to keep out cattle, but around some of these "baghs," as the villagers call them, we can still trace signs of their having been a hedge at one time.

But we must not let such failures as these influence us in the least. Works of such description were no doubt then carried out with little or no supervision, and probably no seed at all was even put in. Thus the result is, as every one would expect, a failure.

But we have other and better results than these in the Punjab, to wit the plantation at Phillour. I may as well here remark that I am not going to include in this paper the best method of planting or sowing where irrigation is practicable, as these are I believe now well known; but in case any one here would like to know further on the subject, I advise his taking a trip to Chunga Munga, a day at which place under the guidance of the local Forest officer would do more to make him conversant with the different modes of cultivation than any description of mine could do.

But to return to the Phillour plantation. It is some 235 to 240 acres in extent, with a hard, sandy, loam soil, and lies close to the town of Phillour, situated on the Sindh, Punjab and Delhi Railway, 108 miles east of Lahore.

I believe Mr. Browne, who will be better able to tell you what methods he adopted than I can, was the first to commence operations on this plot, which were eventually completed by Mr. Ribbentrop.

As far as I have been able to ascertain, the plot was in the first instance trenched at 15 feet apart and sown with Kikar, &c., a small

amount of water being obtained by means of wells. But it did not succeed, and was again resown with but little better result. Planting was then resorted to, and nurseries of Shisham and Phullai (*Dalbergia sissoo* and *Acacia modesta*) were formed in the plantation itself and watered by wells.

During the rains young plants of Shisham and Kikar, obtained from the lines that had succeeded in the former sowings, were put out into pits, and have almost everywhere succeeded.

Thus after three trials and an expense of from Rs. 50 to Rs. 60 per acre, we have a complete plantation dependent simply on the natural rainfall.

But if the difficulties were so great here, where the average annual rainfall is about 20·6 inches, what would they be in the Múltan District, for instance, where the rainfall is only one-fourth of that at Phillour?

And I have further been told, though I cannot vouch for the correctness of the statement, but perhaps Mr. Ribbentrop will be able to enlighten us on the point, that even in this case the young trees were at one time watered by water-carriers (bhistis).

MR. B. RIBBENTROP.—The plants in the Phillour plantation, Mr. Wild mentions in his paper, were raised in nurseries watered by wells. But after they had once been transplanted, they were only watered for a few years during the very hottest season. The plants put out in 1869-70 were only watered at the time of transplanting, but these were certainly planted in the best portion of the plantation.

My own experience on the subject is limited, but such as it is I think it establishes the fact, that a thorough working of the soil, before either sowing or planting, is essentially necessary, and that merely sowing in plough furrows can never succeed.

The area operated on by me comprised 400 acres in the Gújrát bar and 87 in the low hills of the Jhelam District.

The average annual rainfall of that part of the Gújrát District in which the work was carried out is 25·5 inches, but we must remember that in most of the Punjab bars the rainfall is often only local, and some spots may have a plentiful supply, while others close at hand get perhaps only a couple of showers during the year. And this was in some degree, unfortunately for me, the case with the spot I chose for my experiments.

The soil is a hard, sandy loam, with water averaging 40 to 45 feet below the surface. Having no material for planting, I was obliged to content myself with sowing; and even then I could not procure seed of the species of tree, Jhand (*Prosopis spicigera*), which I consider the most suited for such tracts. I employed two methods—sowing in simple plough furrows, and sowing in squares or pits 1′ × 1′ × 1′ at 5′ apart. The former was, as I had anticipated, a failure, and the latter was only a partial success. The cause of the failure of the plough sowing is evident; that of the sowing in squares or pits I attribute, 1*st*, to the scarcity of rain, and, 2*ndly*, to my inability to be present at the time the operation was carried on.

In the Jhelam District where the rainfall is 21 inches, somewhat less than that of the Gújrát District, the soil is also loam, but with a greater percentage of sand, and if anything hardly so stiff. The same methods as above were also adopted and with like results, with the exception that the sand carried along by the rain, which from the intensity of the showers could not penetrate the hard soil quick enough, in many instances choked the seed previous to its germinating.

The seed sown in both instances was principally "Phullahi" (*Acacia modesta*) and Ber (*Zizyphus jujuba*).

Although in neither case can the success be called good, still I think, with even these results before me, that it is quite possible, with due regard to the principles on which such works ought to be carried out, to replant with but few exceptions such rukhs and wastes as we have in the Punjab.

And now let me briefly explain the principles by which we ought to be guided in planting or sowing such tracts.

The chief points which are to be taken into consideration, and which we must apply ourselves to overcome, are the dryness and the hardness of the soil, and the means by which we can ensure an early establishment of the young seedlings or plants. Let us take the dryness as being the most difficult of the three first. Now, how are we to overcome this great obstacle? The rainfall we cannot depend on, and irrigation I suppose is out of the question; we have, therefore, only the natural dewfall and the collection of such little rain as does fall to avail ourselves of. And these ends may both be attained in some degree at least by a thorough working of the soil. It is, I dare say, well known to you all that dew falls to a much greater degree on well ploughed fields than on such hard level tracts as compose the most of our rukhs. Again, it is apparent that rain-water will penetrate well dug up and loosened ground far more easily than compact and hard soil. An increased dew-fall and easier penetration can, therefore, both be secured by a deep and thorough working of the soil. If this is undertaken, our second difficulty, the hardness of the soil, likewise disappears.

Further, in well worked and loosened soil the fine roots of the young seedlings and plants can more easily develope themselves, and it is an acknowledged fact that under such conditions the growth of trees is greatly accelerated.

I now proceed to lay before you those methods of artificial production of forests which I alone consider applicable in the present instance. Of the two great divisions, sowing and planting, of this branch of forestry, let us take sowing first.

Out of the many and various methods of sowing now in vogue, I deem it necessary to mention only two—trench sowing and sowing in squares or pits. In the former, the trenches should run in straight parallel lines from east to west and should be at least a foot broad. The soil within the trench should also be well turned up and loosened to a depth of one foot at least. Digging the trenches should be commenced immediately after the rains, while the ground is soft and easy to work. I should also advise, were the expense not so great, that the earth should be thrown out and left to the action of the atmosphere till shortly before sowing. However, the ground should at any rate be prepared some time before sowing takes place.

The preparation of the soil for sowing in squares or pits is exactly the same as for trench sowing; by the latter a whole continuous line is worked, while by the former the preparation is confined to squares. As a modification of the trench system, I may mention the cultivation in hollows, introduced by Cotta and called in German the *muldenförmige*. It consists in scratching up the upper surface from an 8-foot broad strip, and collecting the scrapings on the south side of the strip. One-third of the cleared surface is left to remain without further preparation, while the second third is dug up and the earth thus obtained thrown on to the remaining third to form a small ridge. The whole is then sown and left to take its chance under three different conditions. In applying this method in the present instance I would dispense with the unworked third, as I feel sure nothing could ever be attained by it. The advantage of this mode is that the dug up portion would act as a drain for the water, and, even if the seed in it rotted or were choked, still the percolation from it would be beneficial to that on the ridge.

MR. RIBBENTROP.—I do not believe sowing will answer at all, but we must first produce plants with roots fully developed in nurseries.

We now come to planting. If this method is adopted, nurseries should be formed as near the site to be operated upon as possible. Pits should be dug, as in the latter case, some time before the young plants are put in, and if possible early after the rains, as the work is less costly and not so difficult, and the soil can be exposed for a longer time to the agency of the atmosphere.

The plants should be taken out of the nurseries with balls of earth attached to the roots, and great care should be taken that the latter are not injured in any way.

But I dare say you are all conversant with planting, and I need, therefore, only explain how the method—the *Königsche plattenpflanzung*—I propose to be adopted on such occasions as the present, differs from that generally in use. It consists simply in making the pits much larger than is ordinarily done. The general custom is to dig the pit the exact counterpart of the ball of earth around the roots of the young plants to be put in; but where we have such an intense heat as in this country, the ball of earth as well as the walls of the pit are apt to contract, and the usual consequence is that the ball dries up, the roots are disturbed in their developement, and the plant withers away. There should always be some extra space between the roots and the sides of the pits, so that the tender rootlets may have some soft earth in which to start and extend themselves before they reach the hard undisturbed soil.

The superiority of the *Königsche plattenpflanzung* was universally acknowledged during the dry season of 1868 in Thuringen.

It is further to be considered whether the use of artificial manure, such as ash manure, would not be beneficial, and I am inclined to think that a slight mixture would. It strengthens a poor soil, loosens a hard one, and by means of the power of absorption and retention of the intermixed particles of charcoal greatly helps to retain moisture.

I have now only one more idea to put before you, certainly an expensive one to experiment on—it is the irrigation of these wastes by

means of steam water-lifts. But I regret to say that I have not yet been able to collect sufficient information as to the cost, &c., of such lifts to lay down any definite proposals, and must, therefore, leave this scheme for some future paper. I believe, however, that Dr. Brandis in his report on the Sind forests put forth the same idea.

MR. MINNIKEN.—The rainfall of the *arid* parts of the bar (the "Bar" is the high waste land in the central tracts between two rivers) averages 6 inches per annum, and Mr. Wild chiefly alludes to districts in which the rainfall is 21 inches.

MR. B. POWELL.—I consider that, although the rainfall of the Jhelam District is set down as 21 inches, yet it must be considered as arid, because the rainfall is local and uncertain, and because it falls often under circumstances which render its beneficial action almost *nil*, as it runs off the hardened soil before it can sink in.

I would here call attention to such cases as the Pubbi Hills in the North Punjab and the Ajmir and Mhairwara Hills of Rajpútaná. In these cases it would be possible to lead off the water from ravines in which it would otherwise run down uselessly and unprofitably. This might either be done by damming up the smaller ravines and collecting the water, or, where the sides of the hill were soft with much marl and sand, preparing a sort of rough level terrace, along which a trench or water-course is taken. The earth from the trench would be thrown up on the outer side, and the whole becomes moistened when the water is let in. The seed sown in such cases has three chances—on the level, at the bottom of the trench, and on the ridge of loose earth. In such cases too great care should be taken to commence at the top of the hill, or else the earth dug out in the levels, the debris and rolling stones, would fall down on the lower works and destroy the plants already put in.

MR. DRYSDALE.—In Berar, where the rainfall is little over 20 inches, the *Acacia Arabica* is raised readily by sowing the seed in notches or small loosened patches made with a few strokes of the spade all over the land it is proposed to replant. This is done before the commencement of the rains, so that germination will take place on the first fall, and the seedlings thus derive the whole benefit from the rainy season. The cost of this is about Rs. 3 per acre, three men being at work—one to make the notch, another to sow the seed, and a third to cover it over with earth.

A paper was then read by MR. BIRNIE BROWNE, Deputy Conservator, Punjab :—

This is a most difficult subject, and one which I have great diffidence in discussing. I will assume that in the tracts alluded to well and canal irrigation is totally impracticable. I will also take for granted that there is no district throughout India where rain does not sometimes fall: it may be only every second, third, fourth, or fifth year, but still when it does it is usually heavy. On this assumption I shall base the following remarks :—

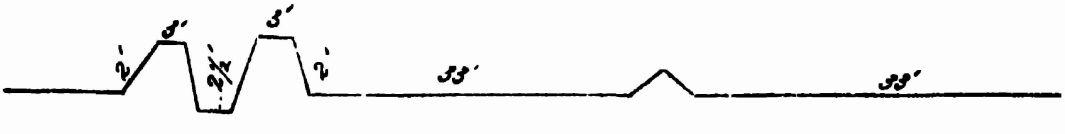
In the first place we require a tree suitable to the circumstances of these arid wastes. This tree will necessarily fulfil two conditions—first, that it has the power of sending down its tap-root to any depth in search of moisture; the other, that it has the capacity of extracting moisture close to the surface, where apparently no moisture exists.

In the Punjab we have two trees which fulfil these conditions, *viz.*, Jhand (*Prosopis spicigera*) and Furwa or Furás (Tamarisk). The great difficulty we have to overcome is the first starting them into life. For this we require a certain amount of surface moisture, and the question is whence is this moisture to be obtained. The Sindh, Punjab and Delhi Railway passes through many portions of land answering to the conditions described, and I believe that many Forest officers will have observed that the only tree vegetation in these arid tracts occurs either in the bed or on the bank of the excavations from which the soil for the railway embankments has been procured. This is the only suggestion which has ever occurred to me that would give the slightest hope of successfully inducing arboreal vegetation on these arid wastes. We have, however, a basis on which to proceed. I would, therefore, propose that an experiment in a suitable locality and on a large scale, say 5,000 acres, should be put in hand.

Two parallel embankments or "bunds" of earth have to be thrown up, with a ditch between, the ditch being 2½ feet deep. This double bank (bunds) and ditch may be made of any length, and should be repeated every 100 feet.

Banks or bunds at intervals of 200 feet, sub-dividing the lengths, should be made. This gives a block of 200'×100'. In the bed of the block ridges should be thrown up 33 feet apart. These ridges I would lay down with cuttings. On the bunds I would sow seed just above the rainfall water-level.

The following is a section of part of a block, with its two bunds and with the ridges for cuttings :—



The ditch between the bunds would act as a drain when the rainfall in excessive.

The whole area of 5,000 acres should be divided into blocks at once and at one time, and previous arrangements made for diverting any collections of water into the blocks from the outside of the area. Good seed should be collected in sufficient quantities, and arrangements made for an immediate supply of tamarisk cuttings, so that when a heavy rainfall occurs the officer in charge could immediately proceed to lay down both cuttings and seed.

A protection from the hot wind is also required to a certain extent. We have this in the bunds, but we want something more. I would, therefore, suggest that "Saccharum" should be planted on the tops of all the bunds. This is a most undesirable plant to have in a plantation, but being under the block system is easily accessible. The seed stalks can be cut down without trouble before arriving at maturity.

MR. RIBBENTROP.—I believe that in the Punjab you can cultivate trees without irrigation wherever the "Saccharum" does not die down in the dry season—

When the seed has germinated and cuttings have sprouted, I would lay down the area between the lines with "Phok" (*Calligonum polygonoides*), as I find that this plant has the power of causing an abundant fall of dew. Why this should be I do not know, but such is undoubtedly the case. Moreover, it affords good grazing for camels and goats.

I started my remarks with the proviso that well and canal irrigation were utterly impracticable, and I can suggest no other scheme for replanting these arid wastes but the one I have attempted very imperfectly to describe. One objection to it is that it will take all the time and skill of a thoroughly energetic officer to carry it out, and that he may be months and even years awaiting a favorable opportunity; but the result will eventually repay the cost.

MR. MINNIKEN.—The principal objection to this scheme would be that, according to the current rates of earthwork with which I have had a good deal to do, it would cost Rs. 60 per block, or about Rs. 120 per acre.

MR. B. POWELL.—I think that, although the cost of the scheme would prevent its being carried out exactly as Mr. Browne proposes, still the idea is good and it would be possible to diminish the amount of earthwork, so as to bring the cost within reasonable bounds.

Simple trenches from 2 to 2½ feet deep might be made, and the earth thrown up on one side only; but it certainly is a most remarkable feature of these arid alluvial lands of the Punjab that, wherever there is an excavation or a hollow in which the scanty rainfall water can lodge, the *Tamarix* speedily springs up as if the seed had already existed in the soil but had remained dormant.

MR. MINNIKEN.—In calling attention to the cost of preparing an acre as proposed by Mr. Browne, I omitted to mention that the cost of preparation would be materially lessened by reducing the depth of excavation to one foot. The soil formed into banks on both sides could also be planted, and should be taken into consideration in estimating the expense per acre, which would probably be about Rs. 40.

MR. WILD.—In that case I consider that the proposal would be worthy of a trial. Further, instead of planting the spoil banks or bunds with Saccharum as Mr. Browne proposes, I would sow with Jhund (*Prosopis*), Tamarisk, or even in the better spots with Ber (*Zizyphus*), and Kikar (*Acacia Arabica*).

MR. RIBBENTROP.—I think that the principle of Mr. Browne's paper is correct and worthy of attention.

As for the question of the ditches, I have noticed that there is no considerable ditch or excavation in the bar in which the Farash (Tamarisk) does not come up naturally. As an instance of successful planting of Farash I may mention Montgomery Dâk Bungalow, where Tamarisk has been planted in ditches about 2½ feet deep by 2 feet broad. These plantations have succeeded admirably.

MR. WILD.—Before the discussion on this paper closes, I would wish to mention that I consider it essentially necessary, should any steps be taken towards *reboising* arid rukhs in the Punjab, that a European officer, trained in planting, should be designated to carry out such works. This officer's attention should be directed to this work alone during the planting season.

MR. B. POWELL.—I wish also to call attention to the exceedingly dry places in which *Dodonæa Burmanniana* grows. It is not suitable for the plains, but for the low sandstone and marl hills of the Northern Punjab to which it is indigenous. Whether it would grow so far south and east as the Ajmir Hills I am not prepared to state.

MR. GAMBLE.—I might also mention the two species of Mudar, (*Calotropis gigantea* and *Procera*) which grow to a size large enough to give wood for charcoal.

MR. KURZ.—The Castor-oil plant might also be found to succeed.

MR, B. POWELL.—The great difficulty in some of these places is that the ground is so hard that until it is worked up in some way no seeds can germinate. You will observe in the paper which I read to you, that they accompanied the efforts to plant trees by sowing broadcast quantities of any spare seeds of any kind they could obtain, with a view of getting some kind of herbaceous covering on the ground. We might carry out this process by sowing seeds of such plants as *Peganum harmala* (Harmal), Mudar, Castor-oil, or the *Calligonum* suggested by Mr. Browne. In a recent letter to me, Captain Wood, Conservator in Oudh, stated that the aridity of the lands there is caused by beds of calcareous concrete known as "kunkur" and by the saline efflorescence called "ooser" or "reh" and "kalr" in the Punjab. Nothing will grow in these saline lands but Tamarisk.

MR. MCL. CAMPBELL.—Some notes on this subject in Sindh may be interesting. Here we are dependent entirely on the overflow of the river or canals, for there is no rainfall; the soil is, however, by no means bad, wanting only moisture.

The frontier station of Jacobabad in Upper Sindh, standing on the edge of the desert, suffered much from scorching winds and violent sandstorms. In 1859 MAJOR MEREWETHER, Political Superintendent on the Frontier (now SIR W. MEREWETHER, Commissioner in Sindh), with a view to establishing plantations and so breaking the force of the wind and sandstorms, selected a piece of ground near a large canal and attempted to raise trees on it. A deep trench was cut along the whole length of the proposed plantation. From this trench smaller trenches were cut at right angles across its breadth at six feet apart.

Seedlings were planted between these ridges, and they throve well until the hot winds set in, when they were burnt up. It was then clear that trees would not establish themselves unless they were protected from the wind. A hedge of the thick growing and hardy plant called *Monjamaree* was, therefore, established to the windward side of the plantation. After the hedge got up the place was restocked with Búbal, Sirris, and *Dalbergia sissoo*. Under the shelter of the hedge the young trees established themselves and have grown rapidly, and Jacobabad is now protected by a wide belt of trees 30 feet high.

I offer some correspondence which will further explain the results of this interesting experiment.

From W. H. BOLTON, ESQ., *Deputy Collector, Frontier Districts of Upper Sindh, to the Political Superintendent on the Frontier of Upper Sindh, No.* 79, *dated Jacobabad,* 9*th February* 1869.

I have the honor to report on the present state of the Government timber tree plantations in this district.

2. There are three on the Núrwah in Deh Alipúr, known respectively as "Macauley's" "Dickenson's" and "Briggs's" Belas. There are also three others in Dehs Khairwah, Muhmudpúr, and Meeranpúr watered from the Bigoree.

3. Dickenson's Bela was established in 1860 by an officer of that name then acting as Assistant Political Superintendent. Macauley's Bela was established in 1859 by Major Macauley, who was also at the time acting assistant political superintendent. Briggs's Bela was established in 1861 by Major Briggs, the Assistant Political Superintendent. The other three belas and various other jungle tracts have been taken in hand by myself, but the plantations only came under my charge in October 1867.

4. Dickenson's Bela is 1,060 beegahs in area, Macauley's Bela 68 beegahs, and Briggs's Bela 270 beegahs. The three in Dehs Khairwah, Muhmudpúr, and Meeranpúr are 50 beegahs each. This year I purpose establishing nine more of the same size.

5. The reason for establishing these belas was owing to the scarcity of timber for building-purposes, and of firewood for the town and cantonments of Jacobabad, and advantage was taken of some waste land near Jacobabad, which was uncultivated, to turn it into grazing grounds for the cattle of the town and cantonments. Some years ago there was no firewood near and around Jacobabad, but vast jungles to the east of the Núrwah have since risen up from the soil, being the growth of the floods. These plantations also break the force of the great duststorms which bear down on Jacobabad during the hot weather.

6. In Dickenson's Bela it is calculated there are about 47,000 trees of all kinds and sizes, but only 126 beegahs have been planted with useful timber trees; the remainder is mostly firewood, and parts are reserved for grazing grounds. In Macauley's and Briggs's Belas there are 51,000 useful trees planted out. The other belas are young and cannot be calculated. There is a mango plantation in each of these belas, that of Dickenson's Bela containing nearly 400 trees.

7. Two years ago I introduced the Tallow, Buhera, Toon, and other seeds into these belas, and the trial will I hope be a successful one.

8. Besides these plantations the planting of road-side trees and conservation of all the old forests and jungles is carefully attended to by me. Not a tree is cut down in the district without a pass from me. I have also established a garden at Thúl, which is thriving admirably.

9. The annexed sheet will give the average cost of these belas and the profits derived therefrom. The belas pay themselves, and have indeed helped for several months towards the planting and preservation of road-side and other trees. The belas pay better in the hot than in the cold weather.

10. In Dickenson's Bela there is one malee, three coolies, two carts, and two pairs of bullocks kept up. Briggs's and Macauley's Belas

have one malee, three coolies, two carts, and two pairs of bullocks. The garden and plantation at Thúl has one malee and one bullock, and the three younger belas have one man only to look after them.

11. Plans are herewith attached of the three oldest belas.

Account of Revenue and Cost of the Government Forests Establishment at Jacobabad for the last four years.

Years.	Revenue.			Expenditure.		
	Rs.	A.	P.	Rs.	A.	P.
Season 1865-66	2,351	3	8	2,325	11	9
„ 1866-67	2,212	14	10	2,141	8	0
„ 1867-68	2,218	5	10	2,134	9	8
„ 1868-69	2,116	0	7	2,091	10	6
Total	8,898	8	11	8,693	7	11

From Major Macauley, *Commandant, 1st Sindh Horse, officiating for the Deputy Collector, Frontier District, Upper Sindh, to the Political Superintendent on the Frontier, dated Jacobabad, the 8th March* 1869.

In forwarding the accompanying letter from Mr. Bolton, the Deputy Collector of the Frontier Districts, relative to the timber plantations, I may add in continuation of his letter that the face of the country in 1859 bore no resemblance to what it is at the present date: at that time there were no trees of any description near Jacobabad available for the wants of civilized people. With infinite trouble Major Jacob and Captain Merewether had induced some of the zemindars to sow babúl seed along their canals, sending them large bags of seed for this purpose; but what with the young trees being eaten down by goats, camels, &c., in addition to the innate apathy of the people, I believe I am well within the mark when I say there was not one tree for one maund of seed. There were no belts of Tamarisk trees as now, nor no prospect of any. Most of the natives were laboring under the conviction that trees would not grow owing to the great heat of the winds that come off the desert, and in a measure there was foundation for the idea.

In 1859 Major Merewether, the Political Superintendent on the Frontier, directed his officiating assistant to try the experiment of making a regular plantation, and selected a piece of ground contiguous to the Núrwah Canal for this purpose. Measures were at once taken to carry out the work and in the following manner: A large nullah was cut along the whole length of the proposed plantation from this feeder, and small deep nullahs were taken at right angles across its breadth and six feet apart. The young plants (seedlings brought from Jacobabad) were planted between these small nullahs; they thus had the advantage of the water without being planted in it. For a short time the seedlings throve, but in the middle of June the weather became so hot with a burning wind off the desert that all the young trees, though protected, were quite burnt up. It became apparent that young trees would not live unless well protected from the hot winds of the desert. This was effected

by sowing a thick hedge of Monjamaree, a hardy and thick-growing plant. The ground was replanted with seedlings of Babúl and Sirrus, and in places with large cuttings of Sirrus. After a little it was found that a thick branch of Sirrus, if very fairly planted in moist ground, soon took root, and in the following years these large cuttings were fine young trees. The Babúl would only grow from seed. In some rows Babúl seeds and young seedlings were put down alternately, so that in case of drying up the other might survive. In most cases both grew. The Black Wood (*Dalbergia sissoo*) grew well from seedlings and cuttings.

3. The nursery for the seedlings of all kinds of trees procurable was in sheltered spots in Jacobabad.

4. The Majenda or Monjamaree hedge was a most successful experiment. It in a very short time most effectually protected the young trees, and without such protection they would not have lived.

5. The Neem (*Azadirachta indica*) grows well from seed only. As far as my experience goes, this remark is equally applicable to the "Neem." A species of Poplar also thrives well. The Euphrates Poplar, I believe, grows usually from seed.

6. I believe the above are the only trees available at present in the Government plantations for carpentery and other purposes, but I have no doubt but that other varieties introduced by Mr. Bolton will be equally successful.

7. I have confined my remarks to the Government plantations, taking no notice of the trees found in the Frontier District forests, nor of the fruit trees which have been introduced into Jacobabad in the various private gardens.

SUBJECT VIII.

THE PROSPECTS OF THE HIMALAYAN CEDAR FORESTS.

MR. G. DUFF's paper was read as follows:—

Having been requested to write a report on the "Prospects of Deodar Reproduction in the Punjab," I herewith append a few notes and remarks on the subject, which, though derived chiefly from personal observation in the Kangra District, may nevertheless be applicable to other parts of the province.

I do not attempt to go into minute details, as regards either the quantity of timber available, or the mode of working the different forests referred to. There are, however, certain broad principles to be attended to in order to ensure success in any undertaking.

In letter No. 2983 from Secretary to Government, Punjab, Public Works Department, dated 7th September 1866, to the Secretary to Government of India, Public Works Department, the number of first class Deodar trees stated as being available (1866) is given as follows:—

Chenab	12,000
Ravi	5,500
Beas	5,000
Sutlej	21,167

Dr. Stewart gives the approximate number of Deodar trees on the Khagan river, the British tributary of the Jhelum, as follows:—

"These estimates are intended only as an indication of the number of first class trees, perhaps the best that could be got under the circumstances and with the time at disposal. The results are roughly speaking as follow:—

	Right bank and tributaries.		Left bank and tributaries.		Total.	
	Plots, patches and forests.	1st class trees.	Plots, patches and forests.	1st class trees.	Plots, patches and forests.	1st class trees.
Of less than 100 trees each ...	42	2,320	26	1,137	68	3,457
Between 100 and 200 ...	17	2,110	17	1,760	34	3,870
More than 200	15	4,600	13	5,530	28	10,130
	74	9,030	56	8,427	130	17,457

"8. If from this total be deducted the 3,457 trees in small patches, and from the remainder 14,000 an allowance is made of 4,000 for

those in unpracticable positions, we have a balance of 10,000 first class trees at present available on the Kunhár. Warned by the errors of the past, I consider it preferable in all such estimates to lean to depreciation rather than exaggeration of the number of trees; but even if a margin of 100 per cent. is given for possible errors, I think it certain that 20,000 will more than cover the maximum number of first class Deodar now at disposal in Khagan.

"9. It may be noted that in a report made by Major Strutt, who felled in Khagan for three years, the number of Deodar of large size was estimated at 60,000. This estimate was probably founded in great part on native statements, which in Khagan as elsewhere often assume the form "bahút diár" even for places where the tree is scarce or absent. Dr. Cleghorn (Punjab Forest Report, 1864) estimated that 'as a maximum 1,000 trees per annum may be taken without producing permanent injury to the forests.' If the estimate now given is nearly correct, it is evident that the average number to be continuously felled per annum must be much reduced from that figure."

The above estimate of trees was made in 1866. Since that date and up to the end of September 1873 we find the following felling recorded as having been made in the different divisions :—

Jhelum (Khagan)	3,491
Chenab	8,588
Ravi	789
Beas	4,973
Sutlej	16,862

thus reducing on paper our original stock of available first class trees to 30,064.

But whereas there can be little doubt as regards the number of trees felled since 1866, I think I am justified in stating that a greater knowledge of the different localities has led to the discovery of numerous groups and scattered trees sufficient to increase the original stock very considerably.

The question then arises as to how far we can safely increase the original figures.

Judging from what I have observed on the Beas and its tributary streams, I think we may safely add 5 per cent. to the original totals.

As we become more familiar with the circumstances of each locality, obstacles in the way of working out timber become less formidable; and such being the case, I repeat that we shall in all probability continue to be on the safe side when we add 5 per cent. to the original estimate of trees.

Let us then first consider the present condition of the forests.

I am of opinion that sufficient attention has not been paid to reproduction since the Forest Department was formed.

Prior to that merchants had on many of the Punjab rivers felled the greater portion of the timber within easy reach of the various streams, and since the Forest Department took the work in hand fellings have in many cases been made to too great an extent in the track of the merchants; that is to say, we have worked more with a view to getting timber landed in our depôts at cheap rates, instead of thinning

out the mature wood from our more distant forests in the first instance, and felling in the more accessible forests only to such an extent as would prevent loss to the department.

I question if the price of Deodar timber in the plains will keep pace with the rise of wages. We must also bear in mind that Deodar is chiefly used in the construction of Government works, and although we as a department may command the supply, Government will fix our rates and in doing so will only allow us a small profit on our actual outlay. Under very favorable circumstances it will be safe to calculate on 80 first class trees, being the outside that can be grown on an acre, and that not in *flat* ground but on rolling slopes or old terraces, where one tree overtops another and thus obtains the necessary light and air.

We may also calculate on 2,000 seedlings being the average that should be planted per acre; hence we find that as a rule for every first class tree cut 25 seedlings should be *established, i. e.*, properly protected and cared for until they have attained a height of 12 or 15 feet. That is the *least* that should be done in the way of reproduction.

DR. SCHLICH.—It is, however, likely to mislead, if we calculate reproduction merely by so many seedlings. The data should always be given by area, giving the method of planting.

We should, however, not rest satisfied with such a result, but should transplant, dibble-in, and sow broadcast in all available plots of land.

One fact should always be borne in mind, *viz.*, that Deodar planting will never bear comparison with planting of any description of forest tree in the plains, because, 1st, the seed is seldom obtainable in sufficiently large quantities; 2nd, the Deodar plant is more difficult to establish than the seedling of any other forest tree with which we have as yet had to deal.

Referring to office records, we find that since 1866 18,703 trees representing 234 acres have been felled, and that 5,25,446 seedlings have been planted. It is not, however, quite clear how many of these seedlings have been established, and I fear, were a careful examination to be made, it would be found that the results are not so satisfactory as they might be.

The rights and privileges held by zemindars are formidable obstacles in the way of reproduction.

The Deodar is not an easy tree to rear, seed is not always available, the seasons are not always favorable, and goats and sheep are always at hand to perform their share of mischief.

As regards, therefore, the present condition of these forests, the two great obstacles in the way of reproduction may be classed under two heads—

1st.—Injudicious fellings.
2nd.—Zemindaree rights.

MR. B. POWELL.—In Mr. Duff's division they are *rights*, because conferred and recorded as such at settlement. In most instances in the leased forests they are only *privileges*.

With regard to the first difficulty, the remedy rests with ourselves. As regards the second, we can only hope that, having laid the case clearly before Government, steps will be taken to curtail zemindaree rights and privileges in such a manner as will improve the condition of the forest with the least possible injury to the zemindars.

Natives as a rule, and hill men more especially, are most tenacious of customs that have been handed down to them by their ancestors. They are thrifty farmers enough, and no doubt experience has taught them how to make the most of their cultivated land; but as regards timber and forest land generally, they are without exception the most wantonly wasteful class of people it would be possible to find.

I maintain that in adopting measures to check the present waste, Government would not only secure a source of revenue to itself, but would earn the gratitude of future generations by providing for their wants in the way of timber.

It is only natural that district officers should wish to see forests cleared and broken up for cultivation, nor should it be our aim to raise frivolous objections to the requirements of an increasing population being met in this respect.

It is our duty, however, to see that forests are cleared and wastes broken up for purposes of cultivation in accordance with a proper system.

I have been some years in this part of the country, and can testify to the want of thought that has been evinced in granting permits for breaking up new land.

In this respect the native of this country merely follows in the footsteps of the early settlers in Canada and other colonies, with this difference however, that, whereas the latter were the pioneers of civilization and destroyed timber in situations from which it would have been impossible to work it out for mercantile purposes, the natives of this country select forest glades and enlarge the same, simply because it is less trouble to do so than to take in and manure a piece of culturable land outside or on the edge of the forest.

Another difficulty in the way of reproduction is the custom of burning the hill sides in order to improve the quality of the grazing.

Now, this practice, if kept under proper control, is not so injurious as might at first be supposed. In most hill districts there are large tracts of waste, generally on the southern and eastern slopes of the mountains, on which no timber does or can be made to grow, owing to the strata of rock dipping the wrong way.

To stop burning these wastes would be to cause needless hardship on zemindars. At the same time it is necessary to guard against the burning being done in a careless manner, and I will hereafter show how I consider this should be effected.

The fatal result of indiscriminate clearings, such as were made in Italy and other countries, ought to be a warning to us against committing similar errors.

To revert to the more immediate subject under discussion. As a forest is cleared of mature timber, it is advisable to cover the ground as quickly as possible with young seedlings; and in most cases it will be found that in removing the branches, chips, and general debris from a forest in which felling operations have been completed, the ground will have been partially prepared to receive a broadcast sowing.

Some foresters in Europe are of opinion that land when cleared of pine timber should be left fallow for some years in order to get rid of its sourness and recover its natural reproductive qualities.

This contingency need not, I think, be taken into account in this country. An Indian sun appears to purify the land in an incredibly short time, and, if we be allowed to judge from the slight deterioration of soil generally in this country, where little or no attention is paid to rotation of crops, it appears to me that our object should be to restock our forests with as little loss of time as possible.

Having proved in many instances that Deodar seed has failed owing to its having been sown too soon after the removal of the standard trees, I would recommend the sowing of Kail (*Pinus excelsa*) seed. Deodar thrives well mixed with Kail, and the latter is more easily got rid of than scrub jungle, which is certain to spring up should the ground be left uncovered.

Another plan for restocking a forest is to sow seed in nurseries and transplant when the seedlings are six inches to 12 inches high. This, though more expensive than the broadcast system, must be had recourse to—

1*st*.—When seed happens to be very scarce.
2*nd*.—To fill up vacancies in plantations where the bulk of the crop has had a start.
3*rd*.—When the land to be planted is light and poor.

In poor light soils the broadcast system does not answer. The seed will probably germinate freely enough, but the seedlings are certain to sicken and die the second year.

Light soils cannot be sufficiently disturbed by the plough, or even by an ordinary hoeing, to enable the roots of the plant to penetrate deep enough to obtain the requisite moisture.

It is not often we have to deal with such soils, but there are cases where, owing to convenience of situation, it may be desirable to form a plantation or restock a worked out forest in this description of land.

Low lying flat land on the banks of streams will generally be found to have no great depth of soil, and it may have been observed that Deodar timber growing on this description of land never attains to any great girth.

The trees die at the top long before they arrive at a size which under more favorable circumstances would entitle them to be considered first class timber.

On the whole, in dealing with land of the above description, we cannot do better than adopt the system followed in planting tea, *viz.*, dig holes three feet deep and about two feet wide at the top, fill in with the best surface soil obtainable on the spot, select well grown seedlings from the nursery, and plant out in the usual manner. This will cost as nearly as possible Rs. 30 per acre, provided the seedlings have not to be carried over half a mile.

The above plan may at first appear to be a slow, expensive, and pottering one to adopt in a forest; but one acre well planted is worth 10 acres badly done, and Rs. 30 is not much after all to pay for planting out 2,000 seedlings; besides it is only in a few cases that such a system need be followed.

Trees growing on land, such as I have been describing, will attain a girth of from four to five feet in 60 or 70 years, and as planting in this kind of soil should be confined to situations along the banks of the main streams, long logs suited for scantlings of about 8″ × 6″ can be launched at comparatively low rates.

I am not aware how we stand with regard to leased forests; but considering Deodar is not a timber that can be planted and felled within the space of an individual lifetime, we would do well to arrange matters with proprietors in order to secure ourselves against future loss. For example, suppose we lease a forest in a native state for a period of 50 years, say during 1870. The area of the forest is 200 acres, there are 50 first class trees to the acre, or in all 10,000 trees. The demand for timber warrants fellings being made at a certain rate, say 500 trees per annum.

The forest at that rate would be cleared in 20 years, so that in 1890 we should have after allowing for proper thinnings—

Saplings of	10 to 18 years of age	...	= 50,000
Ditto and seedlings	1 to 9 ditto	...	= 112,500

and at the expiration of our lease the 200 acres should contain—

Trees of from	30 to 48 years of age	...	= 25,000
Ditto	20 to 30 ditto ...	...	= 56,250

If, therefore, the proprietor should have received a fair seigniorage on the original standing timber, it would only be fair for us to expect to be able to re-imburse ourselves to some extent for our outlay in reproduction.

The chances are, were the forests made over to the proprietor, fellings would be commenced long before the proper time. It would seem advisable, if possible, to secure the leases in perpetuity.

In the event of Deodar timber rates rising in a market degree, we could not expect proprietors to remain satisfied with the present rates of seigniorage; but it might be possible to strike an average rate between the present rates of seigniorage and existing prices of Deodar timber, as sold in the plains, and thus form a sliding scale. This would have to be carefully considered, for our timber is not all sold at first class rates, nor could every stick taken from the forest be considered first class timber.

I had now perhaps better confine my remarks to matters more immediately connected with my own division, and leave it to others to judge how far these may be applicable in their own case.

In order that I may be all the more easily understood, I append hereto a rough sketch map shewing the position of the different forests and the various streams by means of which the timber can be worked out.

I have divided the forests as follows—

(*a*) Forest on the Upper Beas,
(*b*) Ditto Lower do.,
(*c*) Ditto in Waziri Rupi (jaghir),
(*d*) Ditto in Seoraj,

and have sub-divided these into logging and scantling forests. Logging forests are those from which timber can be worked out in log, and scantling forests those from which it will be necessary to work timber out in

sawn pieces. The logging class of forest will yield quicker and in most cases larger returns than the scantling forests, but the working of the one should be made to dovetail into the other.

Mr. Ribbentrop in his sketch of preliminary data for a working plan of the Beas river, estimating roughly, put the first class Deodar trees down at 12,000, including 1,000 trees supposed to be in small groups in what was formerly known as "District Forests."

The above estimate, I am happy to say, appears to be well within the mark.

Since Mr. Ribbentrop's report was written I have made frequent examinations of the Deodar forests in Kulu Proper, Seoraj, and Waziri Rupi, and, although I would rather be under than over the mark, I think I am justified in adding 2,000 trees to the number already on record; or in other words, we may now calculate on their being 10,900 first class Deodar trees in the Beas Division.

Statements are appended showing the fellings since 1866 and the progress made in the way of reproduction.

It is unfortunate that this should have proved a bad season for seed, but I still hope to see 25 per cent. of the sowings germinate.

I have sent to the head office, Lahore, samples of diseased seed in the cone, and in spirits some of the grubs found in the seed itself.

I attribute the failure of the crop to unseasonable weather.

We had heavy rain and cold winds every day from 1st to 15th May, which fact, coupled with a mild winter and light monsoons, accounts, I think, for the seed disease, which has been prevalent throughout Kulu.

The seed taken from trees on the edge of cultivation and along road sides was much better than that collected in forests, which may be owing to the latter being less frequented by flights of small birds.

Planting and sowing have been confined to the Upper Beas and Seoraj.

On the Upper Beas planting has been adopted in filling up blanks in areas that had been previously planted and failed.

In Seoraj sowings only have been made.

I think I may fairly expect to have fewer failures in future.

"Seal Beal," an area of 85 acres, was cut in two by the main road running through its entire length, thus rendering the lower half, or that portion between the road and river, useless as a plantation. This season a road was made (one mile) in common waste land along the upper side of the plantation, so that the river forms the boundary on one side, and the other three have been fenced in with five lines of wire.

Five tons of wire fencing in each division will suffice for Deodar plantations. It is only along public roads and close to villages where it will be necessary to have recourse to so expensive a description of fence. But where thousands of sheep and goats pass close to a plantation annually, it is absolutely necessary to erect strong and efficient fences, and I know of none such other than wire.

Prior to the annexation of the country Kulu Proper and Rupi comprised four distinct Waziris, *viz.*,—

I.—"Lag Sari," between Sarbari and Faujil streams on the right bank of the Beas.

II.—"Lag Maharajah," between Bajoura and Sarbari also on right bank.

III.—"Paraul," between Jia and Rotang on left bank and Faujil stream and Rotang on right bank.

IV.—"Rupi" formed a Waziri of itself.

Seoraj was divided into three Waziris, but I do not know the exact boundaries.

I merely mention these divisions, as in 1863 the Commissioner and Superintendent, Jullunder Division, called for a return of the number of Deodar trees then in the forests, and the list sent was made out "Waziri War."

Kulu may now be said to be in the same stage as regards forests and general advancement that Kangra was some 20 years ago.

The present settlement has about six years to run, and whatever plan may ultimately be adopted for the management of forests in Kulu, it is quite time that we and all concerned gave the matter our careful consideration.

The Sikhs appear to have been the first to have felled in Kulu forests for the purpose of export. Then came the cute Waziri gosain, who was at work immediately before the establishment of the Forest Department. As a matter of course these early fellings were confined to forests and grouped trees within easy reach of the main stream.

There are 158 temples in Kulu Proper (I cannot give the number in Seoraj) and 73 in Waziri Rupi.

These buildings, though requiring a few trees yearly for repairs, &c., may be said to have been the saving of Deodar forests in Kulu. Indeed, some of the best forests were never touched on account of the temples. However, as soon as Government commenced to demarcate, the people began to show less interest in the Deodar forests. This was evinced by their applying for trees, for domestic purposes, in forests from which timber had never been cut for a similar purpose previously.

Moreover, before Government declared itself sole proprietor of all Deodar trees, negociations were commenced for the sale to merchants of trees from certain forests.

The responsibility of future management having fallen on us, we are bound to check waste by every means in our power; but we should not grudge to supply gratis a sufficiency of timber for repairs to temples.

Appendix D affords data bearing on our future management. The circumstances connected with the entire nature of forests in Kulu are so utterly different to any other part of the Punjab, that I do not think we shall be able to apply the same rules to Kulu that have been found to answer in other places.

Forest, waste, and common lands in Kulu are state property.

Valuable timber, such as Deodar, Box, Walnut, Elm, and Chesnut are so intermixed with the less valuable descriptions of timber, that it would be impossible to demarcate on the Hoshiarpúr principle.

Deodar is more confined to certain localities than any other class of timber.

Appendix D also shows the number and the areas of forests that have been demarcated.

I think in time we might increase the reserve areas of Kulu Proper and Seoraj each to 5,000 acres.

Deodar, *Excelsa*, and *Longifolia* are confined chiefly to the hill sides immediately above the mass of cultivation, and consequently in the vicinity of villages. Hence the necessity for demarcating where reproduction is desirable.

Walnut, Box, Chestnut, and Elm on the other hand are found scattered over large areas, at elevations from 5,000 to 9,000 feet above sea-level, varying according to aspect.

I have come to the conclusion that, with the exception of Deodar forests, our Kulu demarcations should not go beyond defining the boundaries of such tracts as are known to be useless as forests.

I think it was in 1867 that considerable restrictions were placed on zemindars burning grass on hill sides. The result is that in Kulu Proper of 110 "Phats"* on the old list, applications were made for leave to burn 33 only; and of 45 in Waziri Rupi, 17 applications were given in; that is to say, that on 77 phats in Kulu and 28 phats in Waziri Rupi, self-sown forest plants have sprung up in sufficient numbers to deter zemindars from burning the grass in those localities.

There are, however, large tracts on which no timber grows, and these might in time be demarcated and virtually handed over to the zemindars to burn, bring under cultivation, or treat as they choose, Government retaining the right to stop burning in any case where the zemindars failed to confine the fire within proper bounds.

I deprecate division of responsibility, and where the nature of zemindaree rights are distinctly understood, there need be no fear of complications arising; and where we have an opportunity of protecting existing valuable timber, and of making reproduction work keep pace with our fellings, it would be folly to tie ourselves down to rules, which, though proved to have worked well in certain localities, are not suitable in the present instance. I do not mean to say that cultivation must be confined to its present limit, or extended only in such lands as I would propose to make over entirely to zemindars; but simply that without consulting the forest officer, no lands other than those made over to village communities should be broken up for purposes of cultivation.

On the other hand, it must not be wondered at should the number of cases tried for breach of forest rules continue to increase for the next few years.

It is not necessary to pound every head of cattle found trespassing in enclosed forests, no more than it is to "chalan" every villager for illicit-fellings. Forest officers should carefully consider the circumstances of the case before taking it into court. But if we are to effect any real tangible results in the way of conservancy, we must hold the position requisite to do so.

Again, referring to Appendix D, it will be seen that the number of cattle in Kulu is considerably less than the number kept by zemindars in Kangra Proper.

There are two reasons for this—

1*st*.—The fact that the rice land in Kulu is prepared by the hoe, and not by the plough as in Kangra.

* Wastes, containing a few scattered trees.

2nd.—For the reason that, although Kulu produces rich and extensive pasturage during the summer months, the severity of the winter renders it necessary to store up fodder, and that is an expensive and troublesome business adopted only by a few of the better classes.

The majority of the people club their live-stock together, and send them to Mundi and Sukhet for the winter months.

The construction of a road and bridges between Manikarun and Phulga on the Parbatti has opened up a new line of country to "Gujars."

During 1870-71 and 1871-72 some 300 buffaloes made their appearance in different parts of Kulu, and some of the head men of kotes were inclined to encourage the Gujars to bring their herds into the valley. I watched the effect of this new feature in the grazing arrangements of Kulu, and found—

1st.—That the advent of the Gujars did not benefit the mass of the people.

2nd.—That those zemindars who keep sheep objected to buffaloes being grazed on their pasture land, owing to the fact that buffaloes taint the grass and render it unfit for sheep grazing. The Negis were, therefore, warned that, if they persisted in encouraging the Gujars to bring their herds into the valley, the circumstance would be taken as a proof that there was more grazing than was required for their own wants, and that certain grazing privileges would be curtailed in some of the reserved forests.

This explanation had the desired effect, and the buffaloes have not returned to the valley since.

There are about 100 head of buffaloes in Waziri Rupi during the summer months, but, as the raf has the Ban Waziri in his own jaghir, no objection could be raised in his case (*Vide* Colonel Lake's rubikar, dated 31st May 1859, on receipt of Financial Commissioner's No. 1020, dated 14th April 1856, enclosing No. 1382, dated 31st March 1856, from Supreme Government).

In my Nos. 59 and 141, dated 24th April and 28th May 1873, respectively, I purposely omitted to include "Kail" (*Pinus excelsa*) in the list of valuable trees for which payment should be made by zemindars.

Kail timber grows in the Kulu and Plach tahsils only; and as zemindars have hitherto been supplied gratis with this class of timber, I considered it would be a breach of faith on our part to price these trees during the present settlement.

The requirements of zemindars in Kulu for timber for their various domestic purposes is very considerable (*Vide* Appendix E).

We need not expect to be able to lessen the drain on Kail timber until a price be fixed on these trees; but efforts are being made to regulate the fellings so as to leave a proper number of trees standing in the different common forests, with a view to the timber attaining some size by the time we can fix rates for it.

At present the great demand is for small trees, third and fourth class, nor will first or second class be taken by zemindars until they find it to their own advantage to take large trees and work the timber up into sawn scantlings.

This matter will require attention when the proper time comes.

The rates will have to be so arranged that there shall be no saving in felling small trees.

I do not think we should ever reckon upon the proceeds of timber sold to zemindars in Kulu as being likely to increase our revenue.

At present the rákhas (Forest guards) are paid by village communities, and I think it very probable that when we price Kail trees we may have to allow a certain percentage of the proceeds to go towards paying the rakahs.

The zemindars will always look to Government to arrange for their wants in the way of timber, and our aim should be so to balance matters that the necessary supply of timber may always be forthcoming without incurring loss to Government.

APPENDIX A.

Fellings in Scantling Forests.

Seoraj fellings in	Number of trees felled.	Average girth.		Average length.		Outturn of Scantling.			Remarks.
		Feet.	Inch.	Feet.	Inch.	6½′×8½″×4½″	6½′×8½″×8½″	13′×9″×5″	
1872-73 ...	1,877	8	4·45	70	4·82	107,566	11,585	.....	Abstract detail of three forests.
1873-74 ...	764	8	4	58	6	4,370	.....	11,460	Abstract detail of two forests.

N. B.—The average length of trees (workable timber) felled during 1873-74 shows 12 feet short of previous felling, and this is accounted for by a portion of the outturn being in double length scantlings.

APPENDIX B.

Deodar fellings in Logging Forests.

Beas and Parbatti fellings from	Number of trees felled.	Average girth.		Average length in feet and inches.	Number of logs.	Remarks.
		Feet.	Inch : dec.			
1866 to 1869 ...	...	...	...	...	...	No data in office.
1870-71	150	9	10·94	110′· 3″	1,402	
1871-72	70	11	0·80	109′·10″	760	
1872-73	98	9	3·55	79′·10″	547	
1873-74	100	10	3·78	86′· 1″	539	
Do.	40	5	11·10	37′· 4″	54	A thinning of trees dead top.

APPENDIX C.

Statement showing number of Deodar Plants established and Area sown broadcast from 1870 *to* 1873.

Plants established.	Number.	Area in acres sown broadcast.	REMARKS.
1871	7,000	.....	
1872	30,000	.....	
1873	.....	20	Half this area is a complete success: the remainder only partially so.
1873	.....	72	Of which 67 acres were sown in Seoraj and five acres on the Upper Beas. Owing to the bad quality of seed, it is feared that something like 25 per cent. only of this will germinate.

APPENDIX D.

Talúka.	No. of kotis.	Population in 1867.	Area in square miles.	Area in acres.	Area of assessed land in acres, 1873.	Amount of Government land-tax, 1873.	Cattle.	Sheep and goats.	No. of rakas.	No. of preserved forests.	Area of reserved forests.	REMARKS.
Kulu Proper...	17	33,410	674	431,360	20,518	27,761	18,195	20,935	27	19	2,795	
Waziri Rupi...	6	12,496	677	433,280	4,500	Jaghir	6,805	12,508	8	13	7,466	
Seoraj ...	25	44,365	575	368,000	13,245	23,339	No data	No data	26	26	3,331	

APPENDIX E.

Statement showing the number of Trees granted from 1*st April* 1872 *to* 30*th September* 1873.

Tahsils.	DESCRIPTION OF TREES SUPPLIED FROM UNRESERVED FORESTS.				TREES FROM RESERVED FORESTS.				REMARKS.
	Deodar.	Kail.	Rai and To's.	Hard wood.	Deodar	Kail.	Rai and To's.	Hard wood.	
Kulu ...	74	17,738	13,263	1,671	4	1,635	41	20	
Plach ...	76	5,709	1,230	418	...	...	...	...	

N. B.—Besides the above 125 Deodar and 513 Kail trees have been supplied for Government works, between the 1st of April and 30th September 1873.

Statement of Deodar Trees felled and Seedlings planted from April 1866 *to the end of September* 1873.

	Jhelum.		Chenab.		Ravi.		Beas.		Sutlej.		Total.		Remarks.
	Deodar trees felled.	Seedlings planted.	Deodar trees felled.	Seedlings planted.	Deodar trees felled.	Seedlings planted.	Deodar trees felled.	Seedlings planted.	Deodar trees felled.	Seedlings planted.	Deodar trees felled.	Seedlings planted.	
1866	...	...	4,000	10,800	18	5,000	792	6,599	250	1,360	5,060	23,759	
1867	500	...	1,002	46,826	...	17,448	120	3,796	167	...	1,789	68,070	
1868	350	...	...	9,000	...	342	397	15,600	208	468	955	25,410	
1869	1,113	...	797	...	155	10,932	432	47,000	237	16,000	2,734	73,932	
1870	666	...	976	...	500	A ...	150	14,337	...	...	2,292	14,337	A, 3 acres planted out.
1871	414	6,136	...	B 2,000	77	C ...	70	35,557	...	1,560	561	45,193	B, 5 acres interplanted. C, 12½ „ planted out.
1872	448	14,000	D 861	67,373	D 39	8,706	1,975	E ...	...	...	3,323	90,079	D, dry trees felled. E, 141 acres planted out.
to 30th September 1873 ...	...	...	F 952	1,36,860	...	47,906	1,037	...	...	...	1,989	1,84,666	F, dry trees felled.
Total ...	3,491	20,136	8,588	2,72,859	789	90,234	4,973	1,22,889	8,862*	19,328	18,703	5,25,446	

* To this must add the grant of 8,000 trees made to Mr. Arratoon and sold by him to Messrs. Brassey & Co. All were not cut however.

MR. RIBBENTROP.—Two things have to be avoided in making plantations.

First it is absurd to expect success with broadcast sowings in open places on deteriorated soil. I have heard of instances where officers have been ordered to sow against their judgment in such places, when cut out forests that still had a fair humus soil were near at hand.

Then it has to be avoided to take young seedlings out of a shady natural forest, and put them out perhaps on to a blank shadeless hill side.

DR. SCHLICH.—I would recommend planting out bad places, first with the hardier species, such as *Pinus excelsa:* let them grow till they are six or eight feet high, and then interplant with well grown nursery seedlings of Deodar. This saves waste of Deodar plants, which if put out as thickly as necessary at first have to be thinned out afterwards.

MR. GREIG'S (N.-W. P.) paper was then read.

Prospects of the reproduction of Deodar in the Himalayas.

The reproduction of Deodar, when the regeneration and improvement of a worked out forest is all that is needed, is simple enough.

2. Unless the forest has been over-worked, and large open spaces left bare, nothing need be done but just keep out fire and grazing.

3. This has been done in the North-Western Provinces forests of Lambertach and Mundhole (about three lakhs of sleepers have been taken out of these forests during the last four years), and the ground, except when strewn with chips and saw-dust, is as well covered with seedlings as could be desired.

MR. B. POWELL.—These should be raked off, the soil would thus be loosened, and seedlings would spring up. It is quite worth while incurring the trifling expense.

4. In spots where there is a prevalence of inferior trees (*P. Webbiana, A. Smithiana, &c.,*) it is intended to fell a sufficient proportion to let in light, and plant out good strong nursery raised Deodars, and, when they have grown up sufficiently, either to ring or fell *all* the inferior kinds of trees.

5. Open spots, such as old sheep-pens, &c., will also be planted with Deodar, the object aimed at being to bring the whole forest to consist entirely of Deodar.

6. The Lambertach forest being in native Gurhwál territory, and only held on a 20 years' lease, in it nature will merely be assisted by keeping out fire and grazing. For the last five years this has been done, and most of the ground which seed can reach is now well covered with seedlings of Deodar and *Pinus excelsa.* The natural reproduction in this forest is very good indeed.

7. The Mundhole forest, which is in British territory, has also been preserved from fire and grazing for the same period, but, although there is a very good show of seedlings in some places, it is not so good

as at Lambertach. This is chiefly owing to the forest being of considerably less area, and the sawing having been confined to a smaller space, the ground is consequently more covered with saw-dust and chips, and until these decay no seed will germinate on such spots.

8. In Mundhole a nursery has been formed for propagating Deodar, and next spring an officer will commence to ring any inferior kinds of trees that are standing amongst beds of naturally sown Deodars, and impeding their growth by keeping out light and sun. This work must be carried out directly under the supervision of an experienced officer: great judgment is required, so much so that I doubt whether it could ever be entrusted to a native subordinate; certainly to none that we have at present.

9. Nurseries have also been formed in the Deodar forests of Konain, Bodya, &c., and there the same system will be carried out as at Mundhole.

10. Sowing seed in the forest, either broadcast, or in lines, or holes, does not answer. If a succession of three or four *favorable* years could be depended on it might succeed, but a season of drought like last winter and spring kills the young trees by hundreds. I should never try this plan again, it is so uncertain. Some lines that were sown in December 1871, and were thickly covered with fine healthy looking seedlings of three and four inches in height the following November, have hardly a living tree in them now. The reason of this is that the young trees grow more *above* the surface of the ground than is good for them, and consequently have not sufficient root growth to withstand a drought. I dug up many of them, and there is no doubt of this: they had merely a few weak offshoots growing from the tap-root, nothing like the fine large bunch of roots of a properly treated nursery raised plant.

11. The healthy appearance of the lines mentioned in paragraph 10 led us to think that the plan was a good one, and a large quantity of 1872 seed was sown in that way. The seed germinated pretty well, considering the want of snow during the winter months, but in April and May the ground got so parched that the young trees died in great numbers, and all the Forest officers agreed with me that the system was *not* a good one, and that it would be far cheaper in the end to raise plants in nurseries, and not plant them out till they had been twice transplanted and had obtained a good strong mass of roots.

12. We all agreed that the proper system would be as follows: Seed to be sown in nursery beds in November. Seedlings to be bedded out at three inches apart during the July following; these seedlings to be transplanted at six inches apart at the commencement of the following rains, to remain there for twelve months, and *then* to be finally planted in the forest at about four feet apart.

DR. SCHLICH.—I should not be disposed to put out my finally treated plants so close as four feet, as it would cause a consumption of an unnecessarily large number, which would be available to stock a large area. If they were put out on a place which required close planting for shade, I would first plant the place with inferior species, and put out the Deodar at regular intervals among the inferior plants.

13. The next question is, how is the Forest Department to provide for the reproduction of Deodar in suitable places; that is, in places where the export, without damage to the wood, is easy, and not in remote and inaccessible side valleys?

14. This is a question I used to think a great deal more about than I now do. The experience gained during the recent sleeper works in the North-Western Provinces has convinced me that there is no fear of not being able to construct such export roads (slides, tramways, shoots, &c.) as will ensure the timber being brought to the rivers cheaply and undamaged, and therefore the question of forming Deodar forests in situations chosen for their accessibility only, but where Deodar has not hitherto existed, has with me lost a great deal of its importance.

MR. B. POWELL.—I have some remarks to offer on this subject. I will give them at the end.

15. It must not be inferred from the above that the North-Western Provinces forests are particularly easy of access. Such is far from the case, as may be seen from reports on the slides and tramways, &c., used in the Mundhole and Lambertach forests, which were submitted to Government lately. At Mundhole there are between five and six miles of slide, tramway, and shoot, and at Lambertach over a mile of tramway and more than a mile of *a very* steep incline of slide.

16. There are many places close to rivers in the Himalayas which appear to be in every way suitable to the growth of Deodar, and of course from such situations the cost of export would be much less than from more distant forests; but then there is the uncertainty as to whether Deodar will grow properly in these untried situations, and, even if it does thrive, the question is whether the expense of forming such forests will be less than renewing the regular Deodar tracts and paying a slightly higher rate for export to the rivers.

17. My impression is that in *really favourable* situations such a course is desirable, but I think that very great caution should be observed: small portions should be planted out at first, and if the plantation thrives it might be increased year by year a little at a time.

18. I have selected a few sites to try such experiments on. They are close to the town at an elevation of about 5,000 feet above the sea; they face the north-west, and are, therefore, only exposed to a portion of the day's sun. The soil appears to be rich, and is at present covered with very fair *P. longifolia* trees. Planting will be commenced in the hollows where the soil is richest, and which from their position are cool and moist. Strong 2½ year old nursery raised seedlings will be planted at four feet apart, and sufficient Chīr trees cleared away to let in light. Year by year a few lines will be added if the plantation appears to be promising, and by degrees the ridges will be reached, the Chīr cleared away, and the whole become a Deodar forest.

MR. B. RIBBENTROP.—I have always observed *P. longifolia* on very poor soil, with little humus, and, as far as my experience goes, I would never hope to raise Deodar in a pure natural forest of *P. longifolia*, though a forest of *P. excelsa* may be converted into Deodar.

MR. B. POWELL.—The *P. longifolia* forests of the North-Western Provinces, at somewhat higher elevations than our Punjab ones, are something magnificent: perhaps the conditions are different; but Chīr forests are very *open* compared with Deodar forests.

The distinction of names in the North-Western Provinces is puzzling: "Cheel" (in Punjab, Kail or Dárchil) is *P. excelsa:* the "Chīr" (Cheel, Punjab) is *P. longifolia.*

19. It would not be wise to commence this kind of planting on a large scale at first with nothing to guide you beyond your own supposition of the capabilities of the soil and situation; better to begin in the cool hollows and gorges, where there is the greatest chance of success, and gradually work your way up the slopes in the manner described.

20. In planting land in which there is a doubt of its suitability for the tree you desire to grow, the most essential point is to have well established nursery raised trees; the probability should be *allowed* that the soil, elevation, and situation are not exactly suited to your tree, and it, therefore, becomes all the more necessary to have your seedlings very strong in root growth before planting them out. The stronger the bunch of roots, the better will be the chance of the young tree overcoming its first difficulties.

21. I hope that at the Forest Conference the subject of the comparative value of Sâl and Deodar may be fully discussed. In the North-Western Provinces there is no demand for Deodar, except for building purposes in hill stations and for railway sleepers. From its distance from the plains Deodar must always be a more expensive timber to bring to market than Sâl, and except for the purposes mentioned the value is less. In the North-Western Provinces there seems to be no demand for it whatever.

22. Well sawn Deodar "kurris" could not be got to Meerut under Re. 1-2 per cubic foot, and then there would be no sale for them; whereas Sâl kurris could be landed at Meerut for about 13 annas per cubic foot, and would sell readily at from Re. 1-4 to Re. 1-8 in 12 feet lengths.

23. Take for instance the sleepering of the Rajpútana State Railway. There is no doubt but that Sâl makes the best sleeper, and that Government would have been quite willing to pay the same price for Sâl sleepers as for Deodar. Allowing that 8,00,000 sleepers (6′ × 8″ × 4″) were required (this is about the number we have prepared for the Rajpútana line), the profit on Sâl over Deodar would have been about 3½ lakhs of rupees, and, as far as I know, a better class of sleepers supplied. Not being able to supply such a large amount of Sâl, owing to the impoverished condition of the forests and the annual local demands which must be met, Deodar, the *next best* timber, was used.

24. The Deodar forests should of course be cared for to a certain extent, but I have always thought that we are not doing sufficient conservancy in our Sâl forests. Jungle fires are the worst enemy, and to keep them out *effectually* would cost money—say Rs. 300 per square mile per annum. The difficult question to decide is, how much Sâl forest, if really properly cared for, would be sufficient for the demands that are

likely to be made on it? However, there is no doubt that *something* should be done. The question is before Government now, and funds have been asked for sufficient to commence with. The proposal is that 18 miles be taken in hand this year, selected plots of six square miles in each of the divisions of Kumaon, Gurhwal, and Dehra. I am wandering from the subject though.

MR. MCKEE, (Central Provinces).—The fire protection in the Sathpúra reserve costs Rs. 10 a square mile for clearing paths and forest watchers.

The grass is burnt down and the trees or saplings cut. The usual width is 45 feet: in dangerous places 150 feet.

MR. DRYSDALE.—In Berar we did 30 square miles for Rs. 200: the width does not increase the expense. Six feet lines are cut on either edges of the intended firepath, and the intermediate space burned. The burning is done at night, when the grass burns slowly.

CAPTAIN DOVETON.—In the Central Provinces the villages in the vicinity have offered to take contracts at very cheap rates for clearing the paths.

25. I think that for every purpose for which Deodar might be used *in the plains*, Sâl is a far better timber in every way: stronger, lasts longer under ground, under water, in buildings, bears exposure better, meets a readier sale, fetches a higher price, and can be brought to market at five annas per cubic foot less expense.

26. I should like this subject to be fully discussed at the Conference. It appears to me that, although the Deodar forests of the North-Western Provinces should not be neglected, our chief attention should be given to the Sâl forests, our aim being to grow a sufficient quantity of Sâl (allowing that it is a better timber than Deodar) to meet all demands, and merely using the Deodar until our object is accomplished. This will of course take a number of years, and will cost a good deal of money; but by taking in hand a few square miles annually the expense will not be much felt, and if Government will supply the money there is no doubt but that the object may be attained.

27. Paragraphs 21—26 only apply to the North-Western Provinces. In the Punjab it is I know very different; there is no Sâl of any account, and, therefore, Deodar is the best timber that can be supplied. My remarks on the superiority of Sâl timber over Deodar must not be accepted as *established facts*. My object in placing them before the Conference is to have the subject freely discussed by experienced men, and thereby gain further knowledge in this very important subject.

MR. B. POWELL.—This is a very excellent paper, and shows the utility of comparing experiences in this way. The different positions of the Himalaya in the North-Western Provinces, as compared with the Himalaya of the Punjab, as regards cedar forests, I never understood before. It is

now clear that while in the North-Western Provinces Deodar occupies a place of only secondary importance, owing to the abundance of Sâl, which is a better timber for most purposes and is nearer the market, in the Punjab it is the only first class timber, for we have no Sâl. This results in the important fact that, while in the old days the Deodar forests in the Punjab bore the whole brunt of the timber demand and were proportionately destroyed in consequence, in the North-Western Provinces they were comparatively speaking left alone, or suffered only from local destruction by "Khíl" cultivation and fires, and are, therefore, in a much less precarious condition, both positively and relatively, as regards their future existence and the supply for them.

In looking to the restoration of Deodar, we have, I think, to attend to the following points:—

1*st*.—To select all the most valuable existing Deodar forests that have been over-worked and see that we work them no more, except to take out trees strictly on reproductive principles, taking those forests first which are in the best positions, and setting to work to restore their condition by artificial aid.

2*nd*.—To select the best *P. excelsa* forests and sites in a good position, and convert them by gradually cutting out the pines and planting cedar.

3*rd*.—To take places suitable for forest, where the rainfall is good and slopes, &c., advantageous for growth and for export, and treat them, not putting out cedar at once, but first giving *P. excelsa* and then putting out Deodar where the *Excelsa* has grown up enough to protect the more delicate growth.

4*th*.—To stop working all the rivers together, and go in exclusively for conservancy and reproduction.

The subject was closed by reading MR. MACKAY'S paper on Deodar on the Upper Ravi as follows:—

Notes on the reproduction of Deodar on the Upper Ravi Division during 1873.

The reproduction of Deodar is a very important subject, and one which requires a close and careful observation of the natural habits and requirements of the plant to enable us to arrive at successful results in its reproduction.

My experience has been so short that I feel as if I had no right to offer any remarks on the subject, as there are officers much better qualified to deal with it than I am. However, the following notes are taken from my plantation official note-book, and I think that it is by

comparing the results of different systems, as carried on in different places, that we can arrive at a correct conclusion.

We must not remain satisfied with artificial reproduction alone, but must encourage and look after natural reproduction as well, as I am convinced that results from this source if properly managed will be as much if not more than artificial cultivation and at a much less cost.

The Deodar forests on the Upper Ravi Division were ruined years ago by contractors, who, by the judicious circulation of a few thousand rupees amongst the Chumba native officials, were allowed to cut indiscriminately all over the forests: the consequence was that all the forests nearest the river and its tributaries, where the timber could be easily filled and launched, were entirely cut out.

Even forests, if the trees were large, were cut where it was impossible to float the timber, and thousands of these logs are still scattered all over the division.

By a rough calculation I find that there are not more than from 8,000 to 10,000 mature Deodar trees on the Upper Ravi, which would only last for a few years if we were to fell—the value of the money we pay yearly to the Chumba State for the lease of the forests. Before this season, there was little or nothing done towards reproduction, and the few places in which attempts had been made to form plantations almost entirely failed, as the plants used for transplanting were too large and buried too deep when transplanted. These plantations were inspected by Mr. Baden Powell in 1872, who made remarks to the same effect in the official note-book. There are certainly some plots of young natural forests scattered over the division, but most of these have been ruined by grazing and the free use of the axe. However, Colonel McAndrew, the Superintendent of Chumba, has put an effectual stop to all this now, as he sees the necessity of assisting the Forest Department in its efforts to restore the forests.

The only obstacle to both the artificial and natural reproduction of Deodar in Chumba is the native official. When the Forest officer selects land, a plantation, or a forest to be reserved, all the surrounding villagers petition the Superintendent of Chumba, stating that such land is the only grazing ground they have, &c., although there is unlimited grazing all over the country. It will, therefore, be seen that, unless the Chumba authorities comply with the Forest officers' wishes in the selection of land suitable for plantations and in the reservation of young forests, it will simply be impossible to carry on reproduction in any way. Ever since I joined this division Colonel McAndrew has rendered me every assistance, and himself takes a great interest in the cultivation of Deodar. It is, however, very different with the native officials, as they look on the Forest officer as an interloper intruding on what they consider their rights and perquisites.

In selecting a site for a Deodar plantation, we must not be guided by the quality or suitableness of the soil alone, but must have soil, aspect, and elevation combined if possible. I have observed during my short experience that the tree is much more sensitive with regard to aspect and elevation than it is to the soil.

In Chumba the finest forests are as a rule to be found on north and north-western aspects. I, therefore, consider that these are the best

to be observed in selecting a site for a plantation, and at an elevation of from 6,000 to 8,000 feet.

The site should be on the main river if possible, and, if not, on one of its largest tributaries, and as near its confluence with the river as can be selected.

After having fixed on a site, it should be at once fenced in and nurseries formed. These ought to be made in a well sheltered and shaded place. The soil ought to be dug up roughly to a depth of 18 inches in the beginning of November, and left exposed during that month. It should then be turned over again, cleared of weeds, stones, &c., and formed into beds four feet wide, leaving a footpath 18 inches wide between each bed. The beds ought to be raised a few inches above the natural level of the soil. The seed, which ought to be fresh, should be sown broadcast, but not too thick, early in December, and covered at once with about a quarter of an inch or less of light sandy soil. Should the weather continue dry after the seed has been sown, the beds ought to be watered sufficiently to keep the soil moist. If treated in the above manner the seed ought to begin to germinate in about 16 days after sowing.

As soon as this takes place the beds must be protected from the sun and severe frosts. This can be done by forming a kind of thatched roof open on all sides, with the back part six feet and the front part four feet above the soil, in order to give sufficient slope to carry rain off the beds.

After the seeds have all germinated the surface soil in the beds ought to be turned up two or three times a week with a pointed stick to encourage the growth of the young plants, and, as the season and vegetation advance, water, light, and air must be given and admitted more freely.

During May and June the beds ought to be watered every second morning, and the shade partly removed, and as soon as the rains set in it can be removed altogether and transplanting commenced.

Here there will doubtless be various opinions as to the best season for transplanting, the age and size of plants to be used, and the best system for transplanting. However, it is very probable that some of us have succeeded to a certain extent by different methods as already stated, and it is only by comparing the results of each officer's work that we can arrive at and lay down a correct one for the successful reproduction of Deodar. I took over charge of this division in January 1873, and the following is the system of transplanting carried on and it results up to January 1874:—

During February and March, 1873, nurseries were hurriedly formed on sites selected for plantations, seed sown, and treated as already stated. By the end of July following these produced seedlings from two to three inches high. In the meantime, or during April, May and June, pits 9″ × 18″ were dug at irregular distances of from three to five feet apart. The pits were filled in a fortnight before transplanting commenced, to allow the soil to subside. As soon as the ground became well soaked by the first showers of rain, the above seedlings were each raised out of the nurseries with a ball of earth round their roots, transplanted, watered, and shaded at the same time, and by the end of August 16,240 seedlings

had been transplanted, watered, and protected from the direct rays of the sun. At the same time 8,000 natural seedlings were taken from an adjoining forest and transplanted on the same plantation.

For the following December, or five months after planting, I found the following results: Nursery seedlings very healthy, and from three to five inches high; casualties about 5 per cent.; natural seedlings very healthy; perpendicular growth very little, but stems thicker and stronger, and plants much more robust than when transplanted; casualties about 10 per cent., and all in open and exposed places without natural vegetation as protection and shade.

This plantation is a cut out part of the Deodar forest adjoining it; has a north-west aspect, and an elevation of about 7,000 feet above the sea. It was covered with young Oak and Rhododendrons, which were all left as they formed shade and protection to the transplant. In fact, success in Deodar planting depends to a great extent on the protection and shade which the plants receive from other trees, which should be left till the second year, or until the plants have fairly established themselves. After the rains of the second season it may be thinned out, and this done yearly until all the natural vegetation has been cleared.

In transplanting great care must be taken that a hollow is not left round each plant where water can lodge, there being nothing more injurious than this, as the plants will die off in thousands in a few days should the rain be heavy and continuous. Natives have also a habit of burying half of the plant and then ramming the soil hard round the stem and roots. This must be carefully guarded against. The transplants ought to be covered with about half an inch of soil above the roots, and then gently but firmly pressed down with both hands. Should there be no natural shade for the plants, they ought to be protected at once by artificial shade, as it is actually necessary whether transplanting takes place in the cold or rainy season.

I find that the best size for transplanting are seedlings from three to five inches high, as they are easier raised out of nurseries without injuring their roots, and suffer less in the transfer than large ones do, and also get established and begin to grow much sooner.

During last year (1873) there were 54,854 Deodar seedlings transplanted on the Upper Ravi Division on about 100 acres of land, or two plantations of 50 acres each. The entire cost of this work to end of December 1873, including preparing the land, making nurseries, transplanting, watering, and protecting, maintenance, filling in vacancies, &c., is Rs. 1,339-12-0.

I consider that 50 acres is as much as ought to be undertaken for one plantation, and two plantations of this extent will be ample to manage or undertake to plant out in any one year. After a plantation has been planted out and fairly established, a forest guard and two coolies ought to be kept on it from March to October to keep the fence in repair and keep down grass, &c., which may be interfering with the growth of the plants. The future management and success of the plantation while thriving commences will of course depend on the knowledge which the officer in charge has of his work.

MR. RIBBENTROP.—Of Punjab rivers the Ravi has one most valuable characteristic. While the Chenab, for instance,

has a length of 380 miles to be traversed before the timber launched from the forests can reach the depôt in the plains, the Ravi is so short that timber reaches Madhopúr in four or five days in the flood season. It is below that place that floating and rafting becomes difficult, owing to scanty water supply.

MR. B. POWELL.—I do not agree with the last paragraph of Mr. Mackay's paper at all. The plantations should be as large as possible: little patches over the country are highly objectionable. How much can be done in a year depends on how much supervision is available, and how much labor.

SUBJECT IX.

FOREST TERMINOLOGY.

The papers of MR. HUME, MR. E. P. DANSEY, and MR. PENGELLY could not be disposed of at the Conference. It was, therefore, determined to print these papers separately in a pamphlet form and circulate them, so that the proposed selection of terms might be carefully considered before any final list was prepared.

[A separate pamphlet is in circulation.—B. H. B. P.]

SUBJECT X.

DATE OF MEETING FOR FUTURE CONFERENCES.

DR. SCHLICH then said that the Members of Conference had taken into consideration the best date for future meetings, and proposed that the middle of September would be the best time and Simla a good place, as in addition to the discussions excursions might be made and useful and instructive studies of the forest granite and vegetation made.

MR. B. POWELL.—We ought to have some competent botanist with us. MR. KURZ would be able to give most valuable instruction on the ground. At Simla we could deal with soils and geology as well as forest vegetation.

It was resolved—

RESOLUTION.—That the Conference recommends the 15th September, or thereabouts, as a suitable date for meeting, and suggest to the Government concerned that it should not be left to choice; but that certain officers should be deputed to attend; and further that such deputation should always include some civil and settlement officers as the most necessary and valuable element in such conferences.

Also that if scientific and engineer officers could attend it would be of the greatest benefit, but that such officers could only be invited.

That Simla would be a suitable place for the next meeting.

That all officers be invited as soon as possible to indicate subjects—at least the most important ones that they wish to be discussed.

Agreed *nem con.*

SUBJECT XI.

FAMILY PENSION FUND FOR THE FOREST SERVICE.

MR. B. POWELL then drew attention to the subject of a widow's and orphan's fund, which had been much talked about during the progress of the Conference. It was most distressing to find cases in which widows of Forest officers were left with families and almost destitute of any suitable provision.

The uncovenanted fund offered certain difficulties. In the first place they demanded 10 per cent. extra for "Forest risks." Mr. B. Powell had addressed the fund managers on the subject, and had received the following reply:—

From W. H. RYLAND, ESQ., *Secretary, Uncovenanted Service Family Pension Fund, to* B. H. B. POWELL, ESQ., *Officiating Inspector General of Forests,—No.* 5044, *dated the* 10*th January* 1874.

In reply to your letter without date received on the 11th ultimo, I am requested by the Directors to inform you that an additional charge of 10 per cent. on the ordinary rates of subscription is imposed on subscribers belonging to the Forest Department, in common with the Survey and other departments involving similar exposure in unhealthy localities or in hazardous service.

There are at present fifteen officers of the Forest Department on the fund, and a few instances of the effect of the rule on their subscriptions are noted on the margin.

For a monthly provision of	Ordinary monthly subscription.	Additional rate at 10 per cent.
Rs. A. P.	Rs. A. P.	Rs. A. P.
240 0 0	53 5 0	5 5 0
90 0 0	37 10 0	3 12 0
100 0 0	29 0 0	2 14 0
30 0 0	14 8 0	1 6 0

It does not appear to the Directors that the additional charge either has been or is likely to prove prohibitory, more especially when viewed in connection with the fact that considerable and increasing abatements on subscriptions are periodically allowed after three years continued payments. Their experience of the Forest Department, I am to add, is not yet sufficient to justify their introducing any change in the rate heretofore charged to subscribers belonging to it.

The Directors would be glad to know how many deaths (to which you refer) have taken place in the department since its formation, and the number of officers employed in it, as a guide to future calculations.

MR. B. POWELL—Thought it possible that Government would consent to pay the 10 per cent. for Forest officers if they had to subscribe.

But the greatest difficulty was that if the scheme was to work, subscription ought to be compulsory, and if so then every one ought to have the reciprocal *right* to subscribe, whereas the uncovenanted fund not being constituted like the Civil Service Fund, *allowed* people only to subscribe, reserving a right to refuse, and requiring medical examinations and fresh enquiries in case a child was admitted to the fund in addition to the original subscription, &c.

DR. SCHLICH asked why Government should not start a fund of its own for all officers under the Department of Agriculture and Commerce not otherwise provided for. This would at once give a very large body of subscribers.

CAPTAIN DOVETON.—Other people might be admitted—the Telegraph Service for instance.

The following resolution was unanimously recorded:—

RESOLUTION.—That the Conference recognizes the great want of a fund, especially to make provision for widows and children.

That the uncovenanted fund being constituted on the basis of a fund to which subscription is not compulsory, its terms are strict, and it requires in some cases renewed medical examinations, and has the right to *refuse* to admit a subscriber: whereas what is wanted is a fund to which every one is compelled to subscribe, and to which as a consequence every one, from the fact of his being admitted into the service, has a right to belong without further restriction or examination.

The services in all cases are only open to candidates who are already declared of sound health, and, therefore, they do not expose such a fund to any unusual risk.

The Conference considers that either the uncovenanted fund should allow the whole service to subscribe (Government making it compulsory) without all the medical examinations now required, or, if this cannot be arranged, that Government should start a fund of its own for the Forest and all other services similarly situated as regards provision for widows and children, and that subscription to this should be compulsory.

That in the event of it being possible to arrange terms with the existing uncovenanted fund, and the 10 per cent. additional charge being deemed necessary, the Government should be asked to defray the charge as an aid to the service.

After a vote of thanks to the Chairman and to the civil officers and visitors, the Conference terminated.

O. S. G. P.—No. 662, R., A. & C.—9-4-74.—400.